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SUMMARY OF NAVY STUDY PROGRAM FOR F4H-1 and F8U-3 WEAPON SYSTEMS

Parameter Plots for Pull-Up Attacks

VOLUME VIII

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I.N. Bellavin and J.C. Ryon

RADAR DIVISION

December 1958

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FOR
F4H-1 and F8U-3 WEAPON SYSTEMS.

Parameter Plots for Pull-Up Attacks, VOLUME ~~VIII~~ [U] (8)

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12

CONTENTS

INTRODUCTION 1

SPACE GEOMETRY 1

PARAMETER VARIATIONS 3

ACKNOWLEDGEMENTS 9

REFERENCES 10

INTRODUCTION

An investigation is reported of

The Bureau of Aeronautics has contracted with Westinghouse, Air Arm Division, for analytical services to be used in a study to establish the tactical use capability of the F4H-1 and F8U-3 Weapon Systems. This study is conducted under the technical direction of the Naval Research Laboratory with all inputs derived from Navy sources. Westinghouse, using these inputs, will submit analytical results to the Navy. Recommendations and conclusions to be drawn from analytical results are assumed to be a Navy responsibility and in particular the responsibility of the technical directors (NRL). This report is the eighth in a series directed toward carrying out this responsibility.

In Volumes I and III type of this series, the effective attack zones for perfectly vectored, head-on pull-up attacks were presented. Selected samples of plots of parameter variations during the various fire control runs were presented. This volume is a continuation of the parameter plots for this head-on pull-up case. All of the runs presented are for the system employing the current AI radar (AN/APQ-50). These runs originate at the 85% probability of detection point for this radar (12-13 n.mi. head-on against B-47 size target). A later volume will present the results for runs made with a system utilizing the improved radar (AN/APQ-72).

SPACE GEOMETRY

Figure A gives a pictorial representation of a sample run for the ideal pull-up situation. As shown on this drawing, the target is non-maneuvering. All attacks occur in a vertical plane through the target and interceptor with no vectoring inaccuracy superimposed. The conditions for this study phase were:

a. Aircraft characteristics - F4H-1[3]

b. Target altitudes - 30,000, 50,000, and 65,000 ft

c. Interceptor altitudes - as capable from below

d. Reflective area - B-47 size target, assumed the same as for the co-altitude case

e. Velocities - interceptor velocity at altitude, V_{max} and V_{cruise}

f. Target velocities used were M 2.0 and M 0.9

g. Perfect vectoring

h. Straight line flight path (target)

i. AI detection capability - current AN/APQ-50, 85% probability

j. Seeker capability - current Sparrow III

k. Missile aerodynamics - current Sparrow III

l. Gimbal angle limitations of current radar - $\pm 41^{\circ}$ azimuth, $+47^{\circ}$ -38° elevation

m. Interceptor restricted to 3g pull-up or $C_{L_{max}}$

The top sketch of Fig. B further illustrates the pull-up attack geometry. A definition of the parameters involved are as follows:

R = Range between interceptor and target positions

V_F = Fighter velocity

λ = Total lead angle (angle between line of sight to target and line of flight of the interceptor)

V_T = Target velocity

γ = Target aspect angle (angle between line of sight to target and line of flight of the target)

ψ = Fighter heading angle measured with respect to space reference

H_F = Fighter altitude

H_T = Target altitude

The lower sketch of Fig. B illustrates the aircraft coordinate system used in this study. Definition of the additional parameters involved are as follows:

α = Fighter angle of attack. This is the angle between the frame reference line (FRL) and the fighter flight path

λ_e = Elevation gimbal angle. This is the angle between the radar gimbal mechanical axis (RGMA) and the line of sight (LOS)

ω_j = Elevation antenna rate. This is equivalent to the rate of change of the LOS

In addition to the parameters illustrated on Fig. B, the following parameters are of interest and are presented later in the report.

L/W = Load factor

$\dot{\lambda}$ = Rate of change of the total lead angle

$\dot{\lambda}_e$ = Rate of change of the elevation gimbal angle

$\dot{R}$ = Range rate

Referring again to Fig. A, it is seen that a sample air battle is plotted. At the start of the engagement the interceptor is flying at 30,000 ft altitude and the target is flying at 50,000 ft altitude. AI radar 85% probability of detection occurs at zero time. Radar lock-on and start of 3g pull-up occurs 10 seconds later. At 15.8 seconds, the interceptor has corrected its flight path to that required for the correct lead pursuit course. At 32 seconds the interceptor has closed the range to the maximum aerodynamic range of the missile (R_{max}). Missile-target impact for firing at R_{max} occurs at 44 seconds. The minimum aerodynamic range is reached 50 seconds after detection.

PARAMETER VARIATIONS

Table 1 gives a complete index of the pull-up runs investigated. A preliminary examination of this table may help the reader in using the somewhat cumbersome numbering system. Referring to the table, it is seen that it is an index of runs along with the initial conditions for each run. The runs have been separated by families. The first family is associated with the following initial conditions.

Target altitude (H_T) = 65,000 ft

Fighter altitude (H_F) = 58,000 ft

Target velocity (V_T) = M 2.0

Fighter velocity (V_F) = V_{max}

The variable parameter in the initial conditions of a given family is pull-up delay after detection.

There are 20 figures associated with this first family grouping. These figures give the parameter variation during the run, starting from the above initial conditions, for 13 parameters. Each of the runs shown are associated with a particular pull-up time delay after AI radar detection.

Figure C is the effective attack zone for pull-up attacks associated with the first family of the index. This is a copy of the effective attack zone originally submitted in Volume I. Referring to this figure we see that this first family (Figs.1 thru 20) results from the runs represented by the top row of points on the effective attack zone (as can be seen from Fig. C, 15 seconds delay was not plotted since it was obviously an unsuccessful run).

With the preceding background information it is now in order to investigate the actual parameter variation plots. The details of the success or failure of each run and the associated reasons are given in Volumes I and III and will not be repeated here. However, a complete description of the first family is in order as an assist to the reader in using the remaining graphs. Throughout this report the first graph of each family will show the resulting variation in range versus time. This is presented not only so the variation in range can be seen, but in order that a ready transformation of the data on the following graphs can be made (some of the parameters are plotted versus time, others versus range). In addition, on this first curve of each family the following points are labeled:

\+ = start of pull-up

▷ = start of lead pursuit

⊙ = R_{max}

X = impact for launch at R_{max} or start of lead pursuit

Ø = R_{min}

.... = $C_L = C_{Lmax}$

These labeled points can then be transferred readily to the other plots in the associated family.

As far as possible two graphs have been included on one sheet and under one figure number. Thus Fig. 1 is composed of two graphs showing the range variation versus time for family 1 where the pull-up starts at detection, and at 5 seconds after detection. Figure 2 shows the range variation versus time for pull-ups starting at 10 and 15 seconds after detection. On each of the runs the actual computer (IBM 704) start occurred at the time of pull-up. The dashed portion of the curves (except for those starting at detection) represents an extension of the run to show the parameter variation prior to pull-up. This prepull-up phase will be shown by the dashed curve for all parameters where this time interval is of importance (or conditions are different than those at pull-up).

Figures 3 and 4 give range rate versus range for the initial conditions of family 1. The dashed portion of the curves again indicate the prepull-up period. Referring to the upper graph of Fig. 3 it is seen that the range rate ($\dot{R}$) varies from -3620 ft/sec to -3000 ft/sec during the run. The negative value arbitrarily indicates a closing velocity.

The graphs of Fig. 5 give the variation in elevation gimbal angle (λ_e) versus range. This is the angle between the RGMA and LOS. Referring to curves No. 1 and No. 2 one might ask why the abrupt change in λ_e. For example on curve No. 1 this abrupt change occurs at approximately 62,000 ft range. Comparing this curve with the corresponding range versus time plot on Fig. 1, it is seen that it is at this point that the interceptor changed from a C_{Lmax} course to a lead pursuit course (lead pursuit was achieved). On curves 3 and 4 it is seen that there is no such abrupt change. Again, a comparison with the corresponding range versus time plots of Fig. 2 gives the answer. Lead pursuit conditions were never achieved. The dashed portion of the curves again give an approximate picture of the variation of this parameter during the phase between detection and pull-up. Referring to curve No. 2 it is seen that there is a gradual change (dashed line) in elevation gimbal angle until pull-up starts at which time the angle goes more negative. The next abrupt

change occurs at the start of lead pursuit. The negative sign arbitrarily represents the condition where the line of sight is below the RGMA (normal condition for a differential altitude attack).

The elevation antenna rate (ω_j) as a function of range is shown on Figs. 6 and 7 for the condition of family 1. ω_j is actually rate of rotation of the LOS in space. Thus, as one would expect, the resulting curves will, in general, be free of abrupt changes during the early part of the runs. However, at short ranges where the problem requirements are exceeding the capability of the interceptor, these abrupt changes will occur.

Figure 8 gives the variation in heading angle (Ψ) versus range. The heading angle is the angle between the horizontal reference plane and the fighter velocity vector. The dashed line does not appear on these curves for obvious reasons. Prior to pull-up, the interceptor velocity vector is in the horizontal reference plane, thus all runs will start with zero heading angle.

The graphs of Figs. 9 and 10 give the variation in load factor (L/W) versus range. Some pertinent points about this parameter can be shown from a comparison of the lower graph of Fig. 9 with the corresponding range versus time plot given on the lower graph of Fig. 1. The dashed portion of the curve indicates, as before, the prepull-up phase. During this period the interceptor is flying straight and level and the pilot would feel the force of gravity on the "seat of his pants" (1g). At 62,000 ft pull-up is initiated. At this point there is a rapid transition from the straight and level flight conditions to a C_{Lmax} condition. At approximately 37,000 ft a lead pursuit course is reached, thus the L/W requirements drop down to 1.25g's. The L/W requirements peaks up again around 12,000 ft range where a C_{Lmax} condition is again encountered.

Figure 11 gives the resulting variation in angle of attack (α). The angle of attack is the angle between the FRL and the fighter velocity vector. Referring to curve No. 2, it is seen that the angle of attack remains constant (interceptor flying under constant speed conditions) between detection and pull-up. At the time of pull-up, the angle of attack builds up rapidly while the interceptor is flying a C_{Lmax} course. When lead pursuit conditions are reached, the angle of attack decreases rapidly and then builds back up to a peak again when the interceptor again reaches C_{Lmax} conditions.

The graphs of Fig. 12 give the variation in fighter speed (V_F) as a function of time. Referring to the upper graph of Fig. 12 and to curve No. 2, some of the points brought out previously can be further illustrated. During the period between detection and pull-up (dashed line) the interceptor is flying at a constant velocity (V_{max} conditions). At pull-up the interceptor starts to slow down. For this particular run the interceptor slows down from 1700 ft/sec to 1340 ft/sec in 13 seconds.

The variations in fighter altitude (H_F) during the runs of family 1 are shown on Figs. 13 and 14.

Figures 15 and 16 give the rate of change of elevation gimbal angle ($\dot{\lambda}_e$) versus range. The reader is cautioned about the use of different scales (necessary for example on the lower graph of Fig. 15 where the variation is very small).

Figure 17 gives the total lead angle (angle between LOS and interceptor velocity vector) versus range for the conditions of family 1 and for the same time-delays as described above (0, 5, 10, and 15 second pull-up delay). Again different scales have been used for the two graphs. Referring to the lower graph of Fig. 17, it is seen that the total lead angle (λ) varies from -5° at the beginning of the run to $+8.8^\circ$ at 8000 ft range and then drops sharply to -8°.

The graphs of Figs. 18 and 19 give the rate of change of lead angle ($\dot{\lambda}$) versus range for the same conditions as above. Referring to the upper graph of Fig. 18 one might ask why the abrupt change in rate of change of lead angle at approximately 62,000 ft range. Comparing this curve with the corresponding range versus time plot on Fig. 1, it is seen that it is at this point that the interceptor changed from a C_{Lmax} course to a lead pursuit course (lead pursuit was achieved). On Fig. 19 it is seen that there is no such abrupt change. Again, a comparison with the corresponding range versus time plot of Fig. 2 gives the answer. Lead pursuit conditions were never achieved.

The curves on the graphs of Fig. 20 show the target aspect (angle between LOS and target flight path) as a function of range. The upper graph shows the results of pull-up runs starting at 0, 10, and 15 seconds after detection. The lower graph shows the results for a pull-up run starting at 5 seconds after detection. Referring to the lower graph of Fig. 20 (pull-up 5 seconds after detection), it is seen that target aspect angle (Υ) varies from 5° to 45° during the run.

The remainder of the graphs in this report will be grouped in families in the same order as described above. To aid the reader, each family will be indicated by a tab on the edge of the report. By cross referencing the particular parameter plot with the corresponding range versus time plot and by inspection of the applicable effective attack zone given in Volumes I and II, the reader should be able to interpret each of the presented curves.

ACKNOWLEDGEMENTS

The data presented in this report represents a continuation of the results of the Navy's Air-to-Air Missile Study Program. The analytical results, including those from which the figures were derived, are the results of the computation work underway at Westinghouse Air Arm Division. The authors would like to thank the Analytical Section of this Division for their major contribution to this report. In addition the authors would like to thank Laurence F. Gilchrist of the Equipment Research Branch, Naval Research Laboratory for his assistance in the preparation of this report.

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TABLE 1

INDEX OF RUNS
(Initial Conditions)

FAMILY 1

Target altitude - 65,000 ft
Fighter altitude - 58,000 ft
Target velocity - M 2.0
Fighter velocity - V_{max}
Pull-up Delay After Detection = PDAD (Variable)

Figure 1 - Range vs Time (PDAD - 0 and 5 secs)

Figure 2 - Range vs Time (PDAD - 10 and 15 secs)

Figure 3 - Range Rate vs Range (PDAD - 0 and 5 secs)

Figure 4 - Range Rate vs Range (PDAD - 10 and 15 secs)

Figure 5 - Elevation Gimbal Angle vs Range (PDAD - 0, 5, 10, and 15 secs)

Figure 6 - Elevation Antenna Rate vs Range (PDAD - 0 and 5 secs)

Figure 7 - Elevation Antenna Rate vs Range (PDAD - 10 and 15 secs)

Figure 8 - Heading Angle vs Range (PDAD - 0, 5, 10, and 15 secs)

Figure 9 - Load Factor vs Range (PDAD - 0 and 5 secs)

Figure 10 - Load Factor vs Range (PDAD - 10 and 15 secs)

Figure 11 - Angle of Attack vs Time (PDAD - 0, 5, 10, and 15 secs)

Figure 12 - Fighter Velocity vs Time (PDAD - 0, 5, 10, and 15 secs)

Figure 13 - Fighter Altitude vs Range (PDAD - 0 and 5 secs)

Figure 14 - Fighter Altitude vs Range (PDAD - 10 and 15 secs)

Figure 15 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 5 secs)

Figure 16 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 10 and 15 secs)

Figure 17 - Total Lead Angle vs Range (PDAD - 0, 5, 10, and 15 secs)

Figure 18 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 19 - Rate of Change of Lead Angle vs Range (PDAD - 10 and 15 secs)

Figure 20 - Target Aspect Angle vs Range (PDAD - 0, 5, 10, and 15 secs)

FAMILY 2

Target altitude - 65,000 ft
Fighter altitude - 55,000 ft
Target velocity - M 2.0
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 21 - Range vs Time (PDAD - 0 and 5 secs)

Figure 22 - Range vs Time (PDAD - 10 and 12 secs)

Figure 23 - Range vs Time (PDAD - 15 secs)

Figure 24 - Range Rate vs Range (PDAD - 0 and 5 secs)

Figure 25 - Range Rate vs Range (PDAD - 10 and 12 secs)

Figure 26 - Range Rate vs Range (PDAD - 15 secs)

Figure 27 - Elevation Gimbal Angle vs Range (PDAD - 0, 5, 10, 12, and 15 secs)

Figure 28 - Elevation Antenna Rate vs Range (PDAD - 0 and 5 secs)

Figure 29 - Elevation Antenna Rate vs Range (PDAD - 10, 12, and 15 secs)

Figure 30 - Heading Angle vs Range (PDAD - 0, 5, 10, 12, and 15 secs)

Figure 31 - Load Factor vs Range (PDAD - 0 and 5 secs)

Figure 32 - Load Factor vs Range (PDAD - 10 and 12 secs)

Figure 33 - Load Factor vs Range (PDAD - 15 secs)

Figure 34 - Angle of Attack vs Time (PDAD - 0, 5, 10, 12, and 15 secs)

Figure 35 - Fighter Speed vs Time (PDAD - 0, 5, 10, 12, and 15 secs)

Figure 36 - Fighter Altitude vs Range (PDAD - 0, 5, 10, 12 and 15 secs)

Figure 37 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 5 secs)

Figure 38 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 10 and 12 secs)

Figure 39 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 secs

Figure 40 - Total Lead Angle vs Range (PDAD - 0, 5, 10, 12 and 15 secs)

Figure 41 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 42 - Rate of Change of Lead Angle vc Range (PDAD - 10 and 12 secs)

Figure 43 - Rate of Change of Lead Angle vs Range (PDAD - 15 secs)

Figure 44 - Target Aspect Angle vs Range (PDAD - 0, 5, 10, 12 and 15 secs)

FAMILY 3

Target altitude - 65,000 ft
Fighter altitude - 45,000 ft
Target velocity - M 2.0
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 45 - Range vs Time (PDAD - 0 and 5 secs)

Figure 46 - Range vs Time (PDAD - 10 and 12 secs)

Figure 47 - Range vs Time (PDAD - 15 and 17 secs)

Figure 48 - Range Rate vs Range (PDAD - 0 and 5 secs)

Figure 49 - Range Rate vs Range (PDAD - 10 and 12 secs)

Figure 50 - Range Rate vs Range (PDAD - 15 and 17 secs)

Figure 51 - Elevation Gimbal Angle vs Range (PDAD - 0, 5, 10, 12, 15 and 17 secs)

Figure 52 - Elevation Antenna Rate vs Range (PDAD - 0, 5, 10, 12, 15 and 17 secs)

Figure 53 - Heading Angle vs Range (PDAD - 0, 5, 10, 12, 15 and 17 secs)

Figure 54 - Load Factor vs Range (PDAD - 0 and 5 secs)

Figure 55 - Load Factor vs Range (PDAD - 10 and 12 secs)

Figure 56 - Load Factor vs Range (PDAD - 15 and 17 secs)

Figure 57 - Angle of Attack vs Time (PDAD - 0, 5, 10, 12, 15 and 17 secs)

Figure 58 - Fighter Speed vs Time (PDAD - 0, 5, 10, 12, 15 and 17 secs)

Figure 59 - Fighter Altitude vs Range (PDAD - 0, 5, 10, 12, 15, and 17 secs)

Figure 60 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 5 secs)

Figure 61 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 10 and 12 secs)

Figure 62 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 63 - Total Lead Angle vs Range (PDAD - 0, 5, 10, 12, 15 and 17 secs)

Figure 64 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 65 - Rate of Change of Lead Angle vs Range (PDAD - 10 and 12 secs)

Figure 66 - Rate of Change of Lead Angle vs Range (PDAD - 15 and 17 secs)

Figure 67 - Target Aspect Angle vs Range (PDAD - 0 and 5 secs)

Figure 68 - Target Aspect Angle vs Range (PDAD - 10 and 12 secs)

Figure 69 - Target Aspect Angle vs Range (PDAD - 15 and 17 secs)

FAMILY 4

Target altitude - 65,000 ft
Fighter altitude - 35,000 ft
Target velocity - M 2.0
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 70 - Range vs Time (PDAD - 0 and 5 secs)

Figure 71 - Range vs Time (PDAD - 10 and 12 secs)

Figure 72 - Range vs Time (PDAD - 15 secs)

Figure 73 - Range Rate vs Range (PDAD - 0 and 5 secs)

Figure 74 - Range Rate vs Range (PDAD - 10 and 12 secs)

Figure 75 - Range Rate vs Range (PDAD - 15 secs)

Figure 76 - Elevation Gimbal Angle vs Range (PDAD - 0, 5, 10, 12 and 15 secs)

Figure 77 - Elevation Antenna Rate vs Range (PDAD - 0, 5, 10, 12 and 15 secs)

Figure 78 - Heading Angle vs Range (PDAD - 0, 5, 10, 12 and 15 secs)

Figure 79 - Load Factor vs Range (PDAD - 0 and 5 secs)

Figure 80 - Load Factor vs Range (PDAD - 10 and 12 secs)

Figure 81 - Load Factor vs Range (PDAD - 15 secs)

Figure 82 - Angle of Attack vs Time (PDAD - 0, 5, 10, 12 and 15 secs)

Figure 83 - Fighter Speed vs Time (PDAD - 0, 5, 10, 12 and 15 secs)

Figure 84 - Fighter Altitude vs Range (PDAD - 0, 5, 10, 12 and 15 secs)

Figure 85 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 5 secs)

Figure 86 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 10 and 12 secs)

Figure 87 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 88 - Total Lead Angle vs Range (PDAD - 0, 5, 10, 12 and 15 secs)

Figure 89 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 90 - Rate of Change of Lead Angle vs Range (PDAD - 10 and 12 secs)

Figure 91 - Rate of Change of Lead Angle vs Range (PDAD - 15 secs)

Figure 92 - Target Aspect Angle vs Range (PDAD - 0 and 5 secs)

Figure 93 - Target Aspect Angle vs Range (PDAD - 10 and 12 secs)

Figure 94 - Target Aspect Angle vs Range (PDAD - 15 secs)

FAMILY 5

Target altitude - 65,000 ft
Fighter altitude - 54,000 ft
Target velocity - M 2.0
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 95 - Range vs Time (PDAD - 0 and 5 secs)

Figure 96 - Range vs Time (PDAD - 10 and 15 secs)

Figure 97 - Range Rate vs Range (PDAD - 0 and 5 secs)

Figure 98 - Range Rate vs Range (PDAD - 10 and 15 secs)

Figure 99 - Elevation Gimbal Angle vs Range (PDAD - 0 and 5 secs)

Figure 100 - Elevation Gimbal Angle vs Range (PDAD - 10 and 15 secs)

Figure 101 - Elevation Antenna Rate vs Range (PDAD - 0 and 5 secs)

Figure 102 - Elevation Antenna Rate vs Range (PDAD - 10 and 15 secs)

Figure 103 - Heading Angle vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 104 - Load Factor vs Range (PDAD - 0 and 5 secs)

Figure 105 - Load Factor vs Range (PDAD - 10 and 15 secs)

Figure 106 - Angle of Attack vs Time (PDAD - 0, 5, 10 and 15 secs)

Figure 107 - Fighter Speed vs Time (PDAD - 0, 5, 10 and 15 secs)

Figure 108 - Fighter Altitude vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 109 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 5 secs)

Figure 110 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 10 and 15 secs)

Figure 111 - Total Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 112 - Total Lead Angle vs Range (PDAD - 10 and 15 secs)

Figure 113 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 114 - Rate of Change of Lead Angle vs Range (PDAD - 10 and 15 secs)

Figure 115 - Target Aspect Angle vs Range (PDAD - 0 and 5 secs)

Figure 116 - Target Aspect Angle vs Range (PDAD - 10 and 15 secs)

FAMILY 6

Target altitude - 65,000 ft
Fighter altitude - 45,000 ft
Target velocity - M 2.0
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 117 - Range vs Time (PDAD - 0 and 10 secs)

Figure 118 - Range vs Time (PDAD - 15 and 20 secs)

Figure 119 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 120 - Range Rate vs Range (PDAD - 15 and 20 secs)

Figure 121 - Elevation Gimbal Angle vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 122 - Elevation Antenna Rate vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 123 - Heading Angle vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 124 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 125 - Load Factor vs Range (PDAD - 15 and 20 secs)

Figure 126 - Angle of Attack vs Time (PDAD - 0, 10, 15 and 20 secs)

Figure 127 - Fighter Speed vs Time (PDAD - 0, 10, 15 and 20 secs)

Figure 128 - Fighter Altitude vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 129 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 130 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 and 20 secs)

Figure 131 - Total Lead Angle vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 132 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 133 - Rate of Change of Lead Angle vs Range (PDAD - 15 and 20 secs)

Figure 134 - Target Aspect Angle vs Range (PDAD - 0, 10, 15 and 20 secs)

FAMILY 7

Target altitude - 65,000 ft
Fighter altitude - 35,000 ft
Target velocity - M 2.0
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 135 - Range vs Time (PDAD - 0 and 10 secs)

Figure 136 - Range vs Time (PDAD - 15 secs)

Figure 137 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 138 - Range Rate vs Range (PDAD - 15 secs)

Figure 139 - Elevation Gimbal Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 140 - Elevation Antenna Rate vs Range (PDAD - 0, 10 and 15 secs)

Figure 141 - Heading Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 142 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 143 - Load Factor vs Range (PDAD - 15 secs)

Figure 144 - Angle of Attack vs Time (PDAD - 0, 10 and 15 secs)

Figure 145 - Fighter Speed vs Time (PDAD 0, 10 and 15 secs)

Figure 146 - Fighter Altitude vs Range (PDAD - 0, 10 and 15 secs)

Figure 147 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 148 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 149 - Total Lead Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 150 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 151 - Rate of Change of Lead Angle vs Range (PDAD - 15 secs)

Figure 152 - Target Aspect Angle vs Range (PDAD - 0, 10 and 15 secs)

FAMILY 8

Target altitude - 65,000 ft
Fighter altitude - 58,000 ft
Target velocity - M 0.9
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 153 - Range vs Time (PDAD - 0 and 15 secs)

Figure 154 - Range vs Time (PDAD - 20 and 25 secs)

Figure 155 - Range Rate vs Range (PDAD - 0 and 15 secs)

Figure 156 - Range Rate vs Range (PDAD - 20 and 25 secs)

Figure 157 - Elevation Gimbal Angle vs Range (PDAD - 0, 15, 20 and 25 secs)

Figure 158 - Elevation Antenna Rate vs Range (PDAD - 0, 15, 20 and 25 secs)

Figure 159 - Heading Angle vs Range (PDAD - 0, 15, 20 and 25 secs)

Figure 160 - Load Factor vs Range (PDAD - 0 and 15 secs)

Figure 161 - Load Factor vs Range (PDAD - 20 and 25 secs)

Figure 162 - Angle of Attack vs Time (PDAD - 0, 15, 20 and 25 secs)

Figure 163 - Fighter Speed vs Time (PDAD - 0, 15, 20 and 25 secs)

Figure 164 - Fighter Altitude vs Range (PDAD - 0, 15, 20 and 25 secs)

Figure 165 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 15 secs)

Figure 166 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 and 25 secs)

Figure 167 - Total Lead Angle vs Range (PDAD - 0, 15, 20 and 25 secs)

Figure 168 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 15 secs)

Figure 169 - Rate of Change of Lead Angle vs Range (PDAD - 20 and 25 secs)

Figure 170 - Target Aspect Angle vs Range (PDAD - 0, 15, 20 and 25 secs)

FAMILY 9

Target altitude - 65,000 ft
Fighter altitude - 55,000 ft
Target velocity - M 0.9
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 171 - Range vs Time (PDAD - 10 and 15 secs)

Figure 172 - Range vs Time (PDAD - 20 secs)

Figure 173 - Range Rate vs Range (PDAD - 10 and 15 secs)

Figure 174 - Range Rate vs Range (PDAD - 20 secs)

Figure 175 - Elevation Gimbal Angle vs Range (PDAD - 10, 15 and 20 secs)

Figure 176 - Elevation Antenna Rate vs Range (PDAD - 10, 15 and 20 secs)

Figure 177 - Heading Angle vs Range (PDAD - 10, 15 and 20 secs)

Figure 178 - Load Factor vs Range (PDAD - 10 and 15 secs)

Figure 179 - Load Factor vs Range (PDAD - 20 secs)

Figure 180 - Angle of Attack vs Time (PDAD - 10, 15 and 20 secs)

Figure 181 - Fighter Speed vs Time (PDAD - 10, 15 and 20 secs)

Figure 182 - Fighter Altitude vs Range (PDAD - 10, 15 and 20 secs)

Figure 183 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 10 and 15 secs)

Figure 184 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 secs)

Figure 185 - Total Lead Angle vs Range (PDAD - 10, 15 and 20 secs)

Figure 186 - Rate of Change of Lead Angle vs Range (PDAD - 10 and 15 secs)

Figure 187 - Rate of Change of Lead Angle vs Range (PDAD - 20 secs)

Figure 188 - Target Aspect Angle vs Range (PDAD - 10, 15 and 20 secs)

FAMILY 10

Target altitude - 65,000 ft
Fighter altitude - 45,000 ft
Target velocity - M 0.9
Fighter velocity - V_{max}
Pull-up Delay After Detection = PDAD (Variable)

Figure 189 - Range vs Time (PDAD - 0 and 5 secs)

Figure 190 - Range vs Time (PDAD - 10 and 20 secs)

Figure 191 - Range vs Time (PDAD - 25 secs)

Figure 192 - Range Rate vs Range (PDAD - 0 and 5 secs)

Figure 193 - Range Rate vs Range (PDAD - 10 and 20 secs)

Figure 194 - Range Rate vs Range (PDAD - 25 secs)

Figure 195 - Elevation Gimbal Angle vs Range (PDAD - 0, 5, 10, 20 and 25 secs)

Figure 196 - Elevation Antenna Rate vs Range (PDAD - 0 and 5 secs)

Figure 197 - Elevation Antenna Rate vs Range (PDAD - 10, 20 and 25 secs)

Figure 198 - Heading Angle vs Range (PDAD - 0, 5 and 10 secs)

Figure 199 - Heading Angle vs Range (PDAD - 20 and 25 secs)

Figure 200 - Load Factor vs Range (PDAD - 0 and 5 secs)

Figure 201 - Load Factor vs Range (PDAD - 10 and 20 secs)

Figure 202 - Load Factor vs Range (PDAD - 25 secs)

Figure 203 - Angle of Attack vs Time (PDAD - 0, 5, 10, 20 and 25 secs)

Figure 204 - Fighter Speed vs Time (PDAD 0, 5, 10, 20 and 25 secs)

Figure 205 - Fighter Altitude vs Range (PDAD - 0, 5, 10, 20 and 25 secs)

Figure 206 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 5 secs)

Figure 207 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 10 and 20 secs)

Figure 208 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 25 secs)

Figure 209 - Total Lead Angle vs Range (PDAD - 0, 5, 10, 20 and 25 secs)

Figure 210 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 211 - Rate of Change of Lead Angle vs Range (PDAD - 10 and 20 secs)

Figure 212 - Rate of Change of Lead Angle vs Range (PDAD - 25 secs)

Figure 213 - Target Aspect Angle vs Range (PDAD - 0, 5, 10, 20 and 25 secs)

FAMILY 11

Target altitude - 65,000 ft
Fighter altitude - 35,000 ft
Target velocity - M 0.9
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 214 - Range vs Time (PDAD - 0 and 5 secs)

Figure 215 - Range vs Time (PDAD - 10 and 15 secs)

Figure 216 - Range vs Time (PDAD - 20 secs)

Figure 217 - Range Rate vs Range (PDAD - 0 and 5 secs)

Figure 218 - Range Rate vs Range (PDAD - 10 and 15 secs)

Figure 219 - Range Rate vs Range (PDAD - 20 secs)

Figure 220 - Elevation Gimbal Angle vs Range (PDAD - 0, 5, 10, 15 and 20 secs)

Figure 221 - Elevation Antenna Rate vs Range (PDAD - 0, 5 and 10 secs)

Figure 222 - Elevation Antenna Rate vs Range (PDAD - 15 and 20 secs)

Figure 223 - Heading Angle vs Range (PDAD - 0, 5, 10, 15 and 20 secs)

Figure 224 - Load Factor vs Range (PDAD - 0 and 5 secs)

Figure 225 - Load Factor vs Range (PDAD - 10 and 15 secs)

Figure 226 - Load Factor vs Range (PDAD - 20 secs)

Figure 227 - Angle of Attack vs Time (PDAD - 0, 5, 10, 15 and 20 secs)

Figure 228 - Fighter Speed vs Time (PDAD - 0, 5, 10, 15 and 20 secs)

Figure 229 - Fighter Altitude vs Range (PDAD - 0, 5, 10, 15 and 20 secs)

Figure 230 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 5 secs)

Figure 231 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 10 and 15 secs)

Figure 232 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 secs)

Figure 233 - Total Lead Angle vs Range (PDAD - 0, 5, 10, 15 and 20 secs)

Figure 234 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 235 - Rate of Change of Lead Angle vs Range (PDAD - 10 and 15 secs)

Figure 236 - Rate of Change of Lead Angle vs Range (PDAD - 20 secs)

Figure 237 - Target Aspect Angle vs Range (PDAD - 0 and 5 secs)

Figure 238 - Target Aspect Angle vs Range (PDAD - 10 and 15 secs)

Figure 239 - Target Aspect Angle vs Range (PDAD - 20 secs)

FAMILY 12

Target altitude - 65,000 ft
Fighter altitude - 54,000 ft
Target velocity - M 0.9
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 240 - Range vs Time (PDAD - 0 and 10 secs)

Figure 241 - Range vs Time (PDAD - 15 and 20 secs)

Figure 242 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 243 - Range Rate vs Range (PDAD - 15 and 20 secs)

Figure 244 - Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 245 - Elevation Gimbal Angle vs Range (PDAD - 15 and 20 secs)

Figure 246 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 247 - Elevation Antenna Rate vs Range (PDAD - 15 and 20 secs)

Figure 248 - Heading Angle vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 249 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 250 - Load Factor vs Range (PDAD - 15 and 20 secs)

Figure 251 - Angle of Attack vs Time (PDAD - 0, 10, 15 and 20 secs)

Figure 252 - Fighter Speed vs Time (PDAD - 0, 10, 15 and 20 secs)

Figure 253 - Fighter Altitude vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 254 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 255 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 and 20 secs)

Figure 256 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 257 - Total Lead Angle vs Range (PDAD - 15 and 20 secs)

Figure 258 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 259 - Rate of Change of Lead Angle vs Range (PDAD - 15 and 20 secs)

Figure 260 - Target Aspect Angle vs Range (PDAD - 0 and 10 secs)

Figure 261 - Target Aspect Angle vs Range (PDAD - 15 and 20 secs)

FAMILY 13

Target altitude - 65,000 ft
Fighter altitude - 45,000 ft
Target velocity - M 0.9
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 262 - Range vs Time (PDAD - 0 and 10 secs)

Figure 263 - Range vs Time (PDAD - 20 and 30 secs)

Figure 264 - Range vs Time (PDAD - 35 secs)

Figure 265 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 266 - Range Rate vs Range (PDAD - 20 and 30 secs)

Figure 267 - Range Rate vs Range (PDAD - 35 secs)

Figure 268 - Elevation Gimbal Angle vs Range (PDAD - 0, 10, 20, 30 and 35 secs)

Figure 269 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 270 - Elevation Antenna Rate vs Range (PDAD - 20, 30 and 35 secs)

Figure 271 - Heading Angle vs Range (PDAD - 0, 10, 20, 30 and 35 secs)

Figure 272 - Load Factor vs Range (PDAD - 0, 10, 20, 30 and 35 secs)

Figure 273 - Angle of Attack vs Time (PDAD - 0, 10, 20, 30 and 35 secs)

Figure 274 - Fighter Speed vs Time (PDAD - 0, 10, 20, 30 and 35 secs)

Figure 275 - Fighter Altitude vs Range (PDAD - 0, 10, 20, 30 and 35 secs)

Figure 276 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 277 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 and 30 secs)

Figure 278 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 35 secs)

Figure 279 - Total Lead Angle vs Range (PDAD - 0, 10, 20, 30 and 35 secs)

Figure 280 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 281 - Rate of Change of Lead Angle vs Range (PDAD - 20 and 30 secs)

Figure 282 - Rate of Change of Lead Angle vs Range (PDAD - 35 secs)

Figure 283 - Target Aspect Angle vs Range (PDAD - 0, 10, 20, 30 and 35 secs)

FAMILY 14

Target altitude - 65,000 ft
Fighter altitude - 35,000 ft
Target velocity - M 0.9
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 284 - Range vs Time (PDAD - 0 and 10 secs)

Figure 285 - Range vs Time (PDAD - 20 and 25 secs)

Figure 286 - Range vs Time (PDAD - 30 secs)

Figure 287 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 288 - Range Rate vs Range (PDAD - 20 and 25 secs)

Figure 289 - Range Rate vs Range (PDAD - 30 secs)

Figure 290 - Elevation Gimbal Angle vs Range (PDAD - 0, 10, 20, 25 and 30 secs)

Figure 291 - Elevation Antenna Rate vs Range (PDAD - 0, 10, 20, 25 and 30 secs)

Figure 292 - Heading Angle vs Range (PDAD - 0, 10, 20 and 25 secs)

Figure 293 - Heading Angle vs Range (PDAD - 30 secs)

Figure 294 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 295 - Load Factor vs Range (PDAD - 20 and 25 secs)

Figure 296 - Load Factor vs Range (PDAD - 30 secs)

Figure 297 - Angle of Attack vs Time (PDAD - 0, 10, 20, 25 and 30 secs)

Figure 298 - Fighter Speed vs Time (PDAD - 0, 10, 20, 25 and 30 secs)

Figure 299 - Fighter Altitude vs Range (PDAD - 0, 10, 20, 25 and 30 secs)

Figure 300 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 301 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 and 25 secs)

Figure 302 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 30 secs)

Figure 303 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 304 - Total Lead Angle vs Range (PDAD - 20 and 25 secs)

Figure 305 - Total Lead Angle vs Range (PDAD - 30 secs)

Figure 306 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 307 - Rate of Change of Lead Angle vs Range (PDAD - 20 and 25 secs)

Figure 308 - Rate of Change of Lead Angle vs Range (PDAD - 30 secs)

Figure 309 - Target Aspect Angle vs Range (PDAD - 0, 10, 20, 25 and 30 secs)

FAMILY 15

Target altitude - 50,000 ft
Fighter altitude - 40,000 ft
Target velocity - M 2.0
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 310 - Range vs Time (PDAD - 0 and 5 secs)

Figure 311 - Range vs Time (PDAD - 10 secs)

Figure 312 - Range Rate vs Range (PDAD - 0 and 5 secs)

Figure 313 - Range Rate vs Range (PDAD - 10 secs)

Figure 314 - Elevation Gimbal Angle vs Range (PDAD - 0, 5 and 10 secs)

Figure 315 - Elevation Antenna Rate vs Range (PDAD - 0 and 5 secs)

Figure 316 - Elevation Antenna Rate vs Range (PDAD - 10 secs)

Figure 317 - Heading Angle vs Range (PDAD - 0, 5 and 10 secs)

Figure 318 - Load Factor vs Range (PDAD - 0 and 5 secs)

Figure 319 - Load Factor vs Range (PDAD - 10 secs)

Figure 320 - Angle of Attack vs Time (PDAD - 0, 5 and 10 secs)

Figure 321 - Fighter Speed vs Time (PDAD - 0, 5 and 10 secs)

Figure 322 - Fighter Altitude vs Range (PDAD - 0, 5, and 10 secs)

Figure 323 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 5 secs)

Figure 324 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 10 secs)

Figure 325 - Total Lead Angle vs Range (PDAD - 0, 5 and 10 secs)

Figure 326 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 327 - Rate of Change of Lead Angle vs Range (PDAD - 10 secs)

Figure 328 - Target Aspect Angle vs Range (PDAD - 0, 5 and 10 secs)

FAMILY 16

Target altitude - 50,000 ft
Fighter altitude - 30,000 ft
Target velocity - M 2.0
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 329 - Range vs Time (PDAD - 0 secs)

Figure 330 - Range Rate vs Range (PDAD - 0 secs)

Figure 331 - Elevation Gimbal Angle vs Range (PDAD - 0 secs)

Figure 332 - Elevation Antenna Rate vs Range (PDAD - 0 secs)

Figure 333 - Heading Angle vs Range (PDAD - 0 secs)

Figure 334 - Load Factor vs Range (PDAD - 0 secs)

Figure 335 - Angle of Attack vs Time (PDAD - 0 secs)

Figure 336 - Fighter Speed vs Time (PDAD - 0 secs)

Figure 337 - Fighter Altitude vs Range (PDAD - 0 secs)

Figure 338 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 secs)

Figure 339 - Total Lead Angle vs Range (PDAD - 0 secs)

Figure 340 - Rate of Change of Lead Angle vs Range (PDAD - 0 secs)

Figure 341 - Target Aspect Angle vs Range (PDAD - 0 secs)

FAMILY 17

Target altitude - 50,000 ft
Fighter altitude - 40,000 ft
Target velocity - M 2.0
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 342 - Range vs Time (PDAD - 0 and 10 secs)

Figure 343 - Range vs Time (PDAD - 15 and 20 secs)

Figure 344 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 345 - Range Rate vs Range (PDAD - 15 and 20 secs)

Figure 346 - Elevation Gimbal Angle vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 347 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 348 - Elevation Antenna Rate vs Range (PDAD - 15 and 20 secs)

Figure 349 - Heading Angle vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 350 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 351 - Load Factor vs Range (PDAD - 15 and 20 secs)

Figure 352 - Angle of Attack vs Time (PDAD - 0, 10, 15 and 20 secs)

Figure 353 - Fighter Speed vs Time (PDAD - 0, 10, 15 and 20 secs)

Figure 354 - Fighter Altitude vs Range (PDAD - 0 and 10 secs)

Figure 355 - Fighter Altitude vs Range (PDAD - 15 and 20 secs)

Figure 356 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 357 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 and 20 secs)

Figure 358 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 359 - Total Lead Angle vs Range (PDAD - 15 and 20 secs)

Figure 360 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 361 - Rate of Change of Lead Angle vs Range (PDAD - 15 and 20 secs)

Figure 362 - Target Aspect Angle vs Range (PDAD - 0 and 10 secs)

Figure 363 - Target Aspect Angle vs Range (PDAD - 15 and 20 secs)

FAMILY 18

Target altitude - 50,000 ft
Fighter altitude - 30,000 ft
Target velocity - M 2.0
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 364 - Range vs Time (PDAD - 0 and 10 secs)

Figure 365 - Range vs Time (PDAD - 15 and 20 secs)

Figure 366 - Range Rate vs Range (PDAD -0 and 10 secs)

Figure 367 - Range Rate vs Range (PDAD - 15 and 20 secs)

Figure 368 - Elevation Gimbal Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 369 - Elevation Gimbal Angle vs Range (PDAD - 20 secs)

Figure 370 - Elevation Antenna Rate vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 371 - Heading Angle vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 372 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 373 - Load Factor vs Range (PDAD - 15 and 20 secs)

Figure 374 - Angle of Attack vs Time (PDAD - 0, 10, 15 and 20 secs)

Figure 375 - Fighter Speed vs Time (PDAD - 0, 10, 15 and 20 secs)

Figure 376 - Fighter Altitude vs Range (PDAD - 0 and 10 secs)

Figure 377 - Fighter Altitude vs Range (PDAD - 15 and 20 secs)

Figure 378 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 379 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 and 20 secs)

Figure 380 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 381 - Total Lead Angle vs Range (PDAD - 15 and 20 secs)

Figure 382 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 383 - Rate of Change of Lead Angle vs Range (PDAD - 15 and 20 secs)

Figure 384 - Target Aspect Angle vs Range (PDAD - 0 and 10 secs)

Figure 385 - Target Aspect Angle vs Range (PDAD - 15 and 20 secs)

FAMILY 19

Target altitude - 50,000 ft
Fighter altitude - 20,000 ft
Target velocity - M 2.0
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 386 - Range vs Time (PDAD - 0 and 10 secs)

Figure 387 - Range vs Time (PDAD - 15 secs)

Figure 388 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 389 - Range Rate vs Range (PDAD - 15 secs)

Figure 390 - Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 391 - Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 392 - Elevation Antenna Rate vs Range (PDAD - 0, 10 and 15 secs)

Figure 393 - Heading Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 394 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 395 - Load Factor vs Range (PDAD - 15 secs)

Figure 396 - Angle of Attack vs Time (PDAD - 0, 10 and 15 secs)

Figure 397 - Fighter Speed vs Time (PDAD - 0, 10 and 15 secs)

Figure 398 - Fighter Altitude vs Range (PDAD - 0 and 10 secs)

Figure 399 - Fighter Altitude vs Range (PDAD - 15 secs)

Figure 400 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 401 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 402 - Total Lead Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 403 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 404 - Rate of Change of Lead Angle vs Range (PDAD - 15 secs)

Figure 405 - Target Aspect Angle vs Range (PDAD - 0, 10 and 15 secs)

FAMILY 20

Target altitude - 50,000 ft
Fighter altitude - 10,000 ft
Target velocity - M 2.0
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 406 - Range vs Time (PDAD - 0 and 10 secs)

Figure 407 - Range vs Time (PDAD - 15 secs)

Figure 408 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 409 - Range Rate vs Range (PDAD - 15 secs)

Figure 410 - Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 411 - Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 412 - Elevation Antenna Rate vs Range (PDAD - 0, 10 and 15 secs)

Figure 413 - Heading Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 414 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 415 - Load Factor vs Range (PDAD - 15 secs)

Figure 416 - Angle of Attack vs Time (PDAD - 0, 10 and 15 secs)

Figure 417 - Fighter Speed vs Time (PDAD - 0 and 10 secs)

Figure 418 - Fighter Speed vs Time (PDAD - 15 secs)

Figure 419 - Fighter Altitude vs Range (PDAD - 0 and 10 secs)

Figure 420 - Fighter Altitude vs Range (PDAD - 15 secs)

Figure 421 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 422 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 423 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 424 - Total Lead Angle vs Range (PDAD - 15 secs)

Figure 425 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 426 - Rate of Change of Lead Angle vs Range (PDAD - 15 secs)

Figure 427 - Target Aspect Angle vs Range (PDAD - 0 and 10 secs)

Figure 428 - Target Aspect Angle vs Range (PDAD - 15 secs)

FAMILY 21

Target altitude - 50,000 ft
Fighter altitude - 40,000 ft
Target velocity - M 0.9
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 429 - Range vs Time (PDAD - 0 and 10 secs)

Figure 430 - Range vs Time (PDAD - 15 secs)

Figure 431 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 432 - Range Rate vs Range (PDAD - 15 secs)

Figure 433 - Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 434 - Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 435 - Elevation Antenna Rate vs Range (PDAD - 0, 10 and 15 secs)

Figure 436 - Heading Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 437 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 438 - Load Factor vs Range (PDAD - 15 secs)

Figure 439 - Angle of Attack vs Time (PDAD - 0, 10 and 15 secs)

Figure 440 - Fighter Speed vs Time (PDAD - 0, 10 and 15 secs)

Figure 441 - Fighter Altitude vs Range (PDAD - 0, 10 and 15 secs)

Figure 442 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 443 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 444 - Total Lead Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 445 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 446 - Rate of Change of Lead Angle vs Range (PDAD - 15 secs)

Figure 447 - Target Aspect Angle vs Range (PDAD - 0, 10 and 15 secs)

FAMILY 22

Target altitude - 50,000 ft
Fighter altitude - 30,000 ft
Target velocity - M 0.9
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 448 - Range vs Time (PDAD - 0 and 10 secs)

Figure 449 - Range vs Time (PDAD - 15 secs)

Figure 450 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 451 - Range Rate vs Range (PDAD - 15 secs)

Figure 452 - Elevation Gimbal Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 453 - Elevation Antenna Rate vs Range (PDAD - 0, 10 and 15 secs)

Figure 454 - Headings Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 455 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 456 - Load Factor vs Range (PDAD - 15 secs)

Figure 457 - Angle of Attack vs Time (PDAD - 0, 10 and 15 secs)

Figure 458 - Fighter Speed vs Time (PDAD - 0, 10 and 15 secs)

Figure 459 - Fighter Altitude vs Range (PDAD - 0, 10 and 15 secs)

Figure 460 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 461 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 462 - Total Lead Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 463 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 464 - Rate of Change of Lead Angle vs Range (PDAD - 15 secs)

Figure 465 - Target Aspect Angle vs Range (PDAD - 0, 10 and 15 secs)

FAMILY 23

Target altitude - 50,000 ft
Fighter altitude - 20,000 ft
Target velocity - M 0.9
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 466 - Range vs Time (PDAD - 0 and 5 secs)

Figure 467 - Range vs Time (PDAD - 10 and 15 secs)

Figure 468 - Range Rate vs Range (PDAD - 0 and 5 secs)

Figure 469 - Range Rate vs Range (PDAD - 10 and 15 secs)

Figure 470 - Elevation Gimbal Angle vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 471 - Elevation Antenna Rate vs Range (PDAD - 0 and 5 secs)

Figure 472 - Elevation Antenna Rate vs Range (PDAD - 10 and 15 secs)

Figure 473 - Heading Angle vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 474 - Load Factor vs Range (PDAD - 0 and 5 secs)

Figure 475 - Load Factor vs Range (PDAD - 10 and 15 secs)

Figure 476 - Angle Attack vs Time (PDAD - 0, 5, 10 and 15 secs)

Figure 477 - Fighter Speed vs Time (PDAD - 0 and 5 secs)

Figure 478 - Fighter Speed vs Time (PDAD - 10 and 15 secs)

Figure 479 - Fighter Altitude vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 480 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 5 secs)

Figure 481 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 10 and 15 secs)

Figure 482 - Total Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 483 - Total Lead Angle vs Range (PDAD - 10 and 15 secs)

Figure 484 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 485 - Rate of Change of Lead Angle vs Range (PDAD - 10 and 15 secs)

Figure 486 - Target Aspect Angle vs Range (PDAD - 0, 5, 10 and 15 secs)

FAMILY 24

Target altitude - 50,000 ft
Fighter altitude - 40,000 ft
Target velocity - M 0.9
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 487 - Range vs Time (PDAD - 0 and 10 secs)

Figure 488 - Range vs Time (PDAD - 20 and 30 secs)

Figure 489 - Range vs Time (PDAD - 35 and 40 secs)

Figure 490 - Range vs Time (PDAD - 45 secs)

Figure 491 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 492 - Range Rate vs Range (PDAD - 20 and 30 secs)

Figure 493 - Range Rate vs Range (PDAD - 35 and 40 secs)

Figure 494 - Range Rate vs Range (PDAD - 45 secs)

Figure 495 - Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 496 - Elevation Gimbal Angle vs Range (PDAD - 20 and 30 secs)

Figure 497 - Elevation Gimbal Angle vs Range (PDAD - 35 and 40 secs)

Figure 498 - Elevation Gimbal Angle vs Range (PDAD - 45 secs)

Figure 499 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 500 - Elevation Antenna Rate vs Range (PDAD - 20 and 30 secs)

Figure 501 - Elevation Antenna Rate vs Range (PDAD - 35 and 40 secs)

Figure 502 - Elevation Antenna Rate vs Range (PDAD - 45 secs)

Figure 503 - Heading Angle vs Range (PDAD - 0, 10, 20, 30, 35, 40 and 45 secs)

Figure 504 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 505 - Load Factor vs Range (PDAD - 20 and 30 secs)

Figure 506 - Load Factor vs Range (PDAD - 35 and 40 secs)

Figure 507 - Load Factor vs Range (PDAD - 45 secs)

Figure 508 - Angle of Attack vs Time (PDAD - 0, 10, 20, 30 and 35 secs)

Figure 509 - Angle of Attack vs Time (PDAD - 40 and 45 secs)

Figure 510 - Fighter Speed vs Time (PDAD - 0, 10, 20, 30 and 35 secs)

Figure 511 - Fighter Speed vs Time (PDAD - 40 and 45 secs)

Figure 512 - Fighter Altitude vs Range (PDAD - 0 and 10 secs)

Figure 513 - Fighter Altitude vs Range (PDAD - 20 and 30 secs)

Figure 514 - Fighter Altitude vs Range (PDAD - 35 and 40 secs)

Figure 515 - Fighter Altitude vs Range (PDAD - 45 secs)

Figure 516 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 517 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 and 30 secs)

Figure 518 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 35 and 40 secs)

Figure 519 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 45 secs)

Figure 520 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 521 - Total Lead Angle vs Range (PDAD - 20 and 30 secs)

Figure 522 - Total Lead Angle vs Range (PDAD - 35 and 40 secs)

Figure 523 - Total Lead Angle vs Range (PDAD - 45 secs)

Figure 524 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 525 - Rate of Change of Lead Angle vs Range (PDAD - 20 and 30 secs)

Figure 526 - Rate of Change of Lead Angle vs Range (PDAD - 35 and 40 secs)

Figure 527 - Rate of Change of Lead Angle vs Range (PDAD - 45 secs)

Figure 528 - Target Aspect Angle vs Range (PDAD - 0 and 10 secs)

Figure 529 - Target Aspect Angle vs Range (PDAD - 20 and 30 secs)

Figure 530 - Target Aspect Angle vs Range (PDAD - 35 and 40 secs)

Figure 531 - Target Aspect Angle vs Range (PDAD - 45 secs)

FAMILY 25

Target altitude - 50,000 ft
Fighter altitude - 30,000 ft
Target velocity - M 0.9
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 532 - Range vs Time (PDAD - 0 and 10 secs)

Figure 533 - Range vs Time (PDAD - 20 and 30 secs)

Figure 534 - Range vs Time (PDAD - 35 and 40 secs)

Figure 535 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 536 - Range Rate vs Range (PDAD - 20 and 30 secs)

Figure 537 - Range Rate vs Range (PDAD - 35 and 40 secs)

Figure 538 - Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 539 - Elevation Gimbal Angle vs Range (PDAD - 20 and 30 secs)

Figure 540 - Elevation Gimbal Angle vs Range (PDAD - 35 and 40 secs)

Figure 541 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 542 - Elevation Antenna Rate vs Range (PDAD - 20, 30, 35 and 40 secs)

Figure 543 - Heading Angle vs Range (PDAD - 0 and 10 secs)

Figure 544 - Heading Angle vs Range (PDAD - 20, 30, 35 and 40 secs)

Figure 545 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 546 - Load Factor vs Range (PDAD - 20 and 30 secs)

Figure 547 - Load Factor vs Range (PDAD - 35 and 40 secs)

Figure 548 - Angle of Attack vs Time (PDAD - 0, 10, 20, 30, 35 and 40 secs)

Figure 549 - Fighter Speed vs Time (PDAD - 0, 10, 20 and 30 secs)

Figure 550 - Fighter Speed vs Time (PDAD - 35 and 40 secs)

Figure 551 - Fighter Altitude vs Range (PDAD - 0 and 10 secs)

Figure 552 - Fighter Altitude vs Range (PDAD - 20 and 30 secs)

Figure 553 - Fighter Altitude vs Range (PDAD - 35 and 40 secs)

Figure 554 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 555 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 and 30 secs)

Figure 556 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 35 and 40 secs)

Figure 557 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 558 - Total Lead Angle vs Range (PDAD - 20 and 30 secs)

Figure 559 - Total Lead Angle vs Range (PDAD - 35 and 40 secs)

Figure 560 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 561 - Rate of Change of Lead Angle vs Range (PDAD - 20 and 30 secs)

Figure 562 - Rate of Change of Lead Angle vs Range (PDAD - 35 and 40 secs)

Figure 563 - Target Aspect Angle vs Range (PDAD - 0 and 10 secs)

Figure 564 - Target Aspect Angle vs Range (PDAD - 20 and 30 secs)

Figure 565 - Target Aspect Angle vs Range (PDAD - 35 and 40 secs)

FAMILY 26

Target altitude - 50,000 ft
Fighter altitude - 20,000 ft
Target velocity - M 0.9
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 566 - Range vs Time (PDAD - 0 and 10 secs)

Figure 567 - Range vs Time (PDAD - 20 and 25 secs)

Figure 568 - Range vs Time (PDAD - 30 and 35 secs)

Figure 569 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 570 - Range Rate vs Range (PDAD - 20 and 25 secs)

Figure 571 - Range Rate vs Range (PDAD - 30 and 35 secs)

Figure 572 - Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 573 - Elevation Gimbal Angle vs Range (PDAD - 20 and 25 secs)

Figure 574 - Elevation Gimbal Angle vs Range (PDAD - 30 and 35 secs)

Figure 575 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 576 - Elevation Antenna Rate vs Range (PDAD - 20 and 25 secs)

Figure 577 - Elevation Antenna Rate vs Range (PDAD - 30 and 35 secs)

Figure 578 - Heading Angle vs Range (PDAD - 0 and 10 secs)

Figure 579 - Heading Angle vs Range (PDAD - 20, 25, 30 and 35 secs)

Figure 580 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 581 - Load Factor vs Range (PDAD - 20 and 25 secs)

Figure 582 - Load Factor vs Range (PDAD - 30 and 35 secs)

Figure 583 - Angle of Attack vs Time (PDAD - 0, 10, 20 and 25 secs)

Figure 584 - Angle of Attack vs Time (PDAD - 30 and 35 secs)

Figure 585 - Fighter Speed vs Time (PDAD - 0, 10, 20, 25, 30 and 35 secs)

Figure 586 - Fighter Altitude vs Range (PDAD - 0 and 10 secs)

Figure 587 - Fighter Altitude vs Range (PDAD - 20 and 25 secs)

Figure 588 - Fighter Altitude vs Range (PDAD - 30 and 35 secs)

Figure 589 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 590 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 and 25 secs)

Figure 591 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 30 and 35 secs)

Figure 592 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 593 - Total Lead Angle vs Range (PDAD - 20 and 25 secs)

Figure 594 - Total Lead Angle vs Range (PDAD - 30 and 35 secs)

Figure 595 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 596 - Rate of Change of Lead Angle vs Range (PDAD - 20 and 25 secs)

Figure 597 - Rate of Change of Lead Angle vs Range (PDAD - 30 and 35 secs)

Figure 598 - Target Aspect Angle vs Range (PDAD - 0 and 10 secs)

Figure 599 - Target Aspect Angle vs Range (PDAD - 20 and 25 secs)

Figure 600 - Target Aspect Angle vs Range (PDAD - 30 and 35 secs)

FAMILY 27

Target altitude - 50,000 ft
Fighter altitude - 10,000 ft
Target velocity - M 0.9
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 601 - Range vs Time (PDAD - 0 and 10 secs)

Figure 602 - Range vs Time (PDAD - 20 and 25 secs)

Figure 603 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 604 - Range Rate vs Range (PDAD - 20 and 25 secs)

Figure 605 - Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 606 - Elevation Gimbal Angle vs Range (PDAD - 20 and 25 secs)

Figure 607 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 608 - Elevation Antenna Rate vs Range (PDAD - 20 and 25 secs)

Figure 609 - Heading Angle vs Range (PDAD - 0, 10, 20 and 25 secs)

Figure 610 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 611 - Load Factor vs Range (PDAD - 20 and 25 secs)

Figure 612 - Angle of Attack vs Time (PDAD - 0, 10, 20 and 25 secs)

Figure 613 - Fighter Speed vs Time (PDAD - 0, 10, 20 and 25 secs)

Figure 614 - Fighter Altitude vs Range (PDAD - 0, 10 and 20 secs)

Figure 615 - Fighter Altitude vs Range (PDAD - 25 secs)

Figure 616 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 617 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 and 25 secs)

Figure 618 - Total Lead Angle vs Range (PDAD - 0, 10, 20 and 25 secs)

Figure 619 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 620 - Rate of Change of Lead Angle vs Range (PDAD - 20 and 25 secs)

Figure 621 - Target Aspect Angle vs Range (PDAD - 0 and 10 secs)

Figure 622 - Target Aspect Angle vs Range (PDAD - 20 and 25 secs)

FAMILY 28

Target altitude - 30,000 ft
Fighter altitude - 20,000 ft
Target velocity - M 2.0
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 623 - Range vs Time (PDAD - 0 and 5 secs)

Figure 624 - Range vs Time (PDAD - 10 and 15 secs)

Figure 625 - Range Rate vs Range (PDAD - 0 and 5 secs)

Figure 626 - Range Rate vs Range (PDAD - 10 and 15 secs)

Figure 627 - Elevation Gimbal Angle vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 628 - Elevation Antenna Rate vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 629 - Heading Angle vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 630 - Load Factor vs Range (PDAD - 0 and 5 secs)

Figure 631 - Load Factor vs Range (PDAD - 10 and 15 secs)

Figure 632 - Angle of Attack vs Time (PDAD - 0, 5, 10 and 15 secs)

Figure 633 - Fighter Speed vs Time (PDAD - 0, 5, 10 and 15 secs)

Figure 634 - Fighter Altitude vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 635 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 5 secs)

Figure 636 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 10 and 15 secs)

Figure 637 - Total Lead Angle vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 638 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 639 - Rate of Change of Lead Angle vs Range (PDAD - 10 and 15 secs)

Figure 640 - Target Aspect Angle vs Range (PDAD - 0, 5, 10 and 15 secs)

FAMILY 29

Target altitude - 30,000 ft
Fighter altitude - 10,000 ft
Target velocity - M 2.0
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 641 - Range vs Time (PDAD - 0 and 5 secs)

Figure 642 - Range vs Time (PDAD - 10 and 15 secs)

Figure 643 - Range Rate vs Range (PDAD - 0 and 5 secs)

Figure 644 - Range Rate vs Range (PDAD - 10 and 15 secs)

Figure 645 - Elevation Gimbal Angle vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 646 - Elevation Antenna Rate vs Range (PDAD - 0 and 5 secs)

Figure 647 - Elevation Antenna Rate vs Range (PDAD - 10 and 15 secs)

Figure 648 - Heading Angle vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 649 - Load Factor vs Range (PDAD - 0 and 5 secs)

Figure 650 - Load Factor vs Range (PDAD - 10 and 15 secs)

Figure 651 - Angle of Attack vs Time (PDAD - 0, 5, 10 and 15 secs)

Figure 652 - Fighter Speed vs Time (PDAD - 0, 5, 10 and 15 secs)

Figure 653 - Fighter Altitude vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 654 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 5 secs)

Figure 655 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 10 and 15 secs)

Figure 656 - Total Lead Angle vs Range (PDAD - 0, 5, 10 and 15 secs)

Figure 657 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 5 secs)

Figure 658 - Rate of Change of Lead Angle vs Range (PDAD - 10 and 15 secs)

Figure 659 - Target Aspect Angle vs Range (PDAD - 0, 5, 10 and 15 secs)

FAMILY 30

Target altitude - 30,000 ft
Fighter altitude - sea level
Target velocity - M 2.0
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 660 - Range vs Time (PDAD - 0 and 10 secs)

Figure 661 - Range vs Time (PDAD - 15 secs)

Figure 662 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 663 - Range Rate vs Range (PDAD - 15 secs)

Figure 664 - Elevation Gimbal Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 665 - Elevation Antenna Rate vs Range (PDAD - 0, 10 and 15 secs)

Figure 666 - Heading Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 667 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 668 - Load Factor vs Range (PDAD - 15 secs)

Figure 669 - Angle of Attack vs Time (PDAD - 0, 10 and 15 secs)

Figure 670 - Fighter Speed vs Time (PDAD - 0, 10 and 15 secs)

Figure 671 - Fighter Altitude vs Range (PDAD - 0, 10 and 15 secs)

Figure 672 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 673 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 674 - Total Lead Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 675 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 676 - Rate of Change of Lead Angle vs Range (PDAD - 15 secs)

Figure 677 - Target Aspect Angle vs Range (PDAD - 0, 10 and 15 secs)

FAMILY 31

Target altitude - 30,000 ft
Fighter altitude - 20,000 ft
Target velocity - M 2.0
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 678 - Range vs Time (PDAD - 0 and 10 secs)

Figure 679 - Range vs Time (PDAD - 15 secs)

Figure 680 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 681 - Range Rate vs Range (PDAD - 15 secs)

Figure 682 - Elevation Gimbal Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 683 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 684 - Elevation Antenna Rate vs Range (PDAD - 15 secs)

Figure 685 - Heading Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 686 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 687 - Load Factor vs Range (PDAD - 15 secs)

Figure 688 - Angle of Attack vs Time (PDAD - 0, 10 and 15 secs)

Figure 689 - Fighter Speed vs Time (PDAD - 0, 10 and 15 secs)

Figure 690 - Fighter Altitude vs Range (PDAD - 0, 10 and 15 secs)

Figure 691 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 692 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 693 - Total Lead Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 694 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 695 - Rate of Change of Lead Angle vs Range (PDAD - 15 secs)

Figure 696 - Target Aspect Angle vs Range (PDAD - 0, 10 and 15 secs)

FAMILY 32

Target altitude - 30,000 ft
Fighter altitude - 10,000 ft
Target velocity - M 2.0
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 697 - Range vs Time (PDAD - 0 and 10 secs)

Figure 698 - Range vs Time (PDAD - 15 secs)

Figure 699 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 700 - Range Rate vs Range (PDAD - 15 secs)

Figure 701 - Elevation Gimbal Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 702 - Elevation Antenna Rate vs Range (PDAD - 0, 10 and 15 secs)

Figure 703 - Heading Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 704 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 705 - Load Factor vs Range (PDAD - 15 secs)

Figure 706 - Angle of Attack vs Time (PDAD - 0,10 and 15 secs)

Figure 707 - Fighter Speed vs Time (PDAD - 0, 10 and 15 secs)

Figure 708 - Fighter Altitude vs Range (PDAD - 0, 10 and 15 secs)

Figure 709 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 710 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 711 - Total Lead Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 712 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 713 - Rate of Change of Lead Angle vs Range (PDAD - 15 secs)

Figure 714 - Target Aspect Angle vs Range (PDAD - 0, 10 and 15 secs)

FAMILY 33

Target altitude - 30,000 ft
Fighter altitude - sea level
Target velocity - M 2.0
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 715 - Range vs Time (PDAD - 0 and 10 secs)

Figure 716 - Range vs Time (PDAD - 15 secs)

Figure 717 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 718 - Range Rate vs Range (PDAD - 15 secs)

Figure 719 - Elevation Gimbal Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 720 - Elevation Antenna Rate vs Range (PDAD - 0, 10 and 15 secs)

Figure 721 - Heading Angle vs Range (PDAD - 0, 10 and 15 secs)

Figure 722 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 723 - Load Factor vs Range (PDAD - 15 secs)

Figure 724 - Angle of Attack vs Time (PDAD - 0, 10 and 15 secs)

Figure 725 - Fighter Speed vs Time (PDAD - 0, 10 and 15 secs)

Figure 726 - Fighter Altitude vs Range (PDAD - 0 and 10 secs)

Figure 727 - Fighter Altitude vs Range (PDAD - 15 secs)

Figure 728 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 729 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 secs)

Figure 730 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 731 - Total Lead Angle vs Range (PDAD - 15 secs)

Figure 732 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 733 - Rate of Change of Lead Angle vs Range (PDAD - 15 secs)

Figure 734 - Target Aspect Angle vs Range (PDAD - 0, 10 and 15 secs)

FAMILY 34

Target altitude - 30,000 ft
Fighter altitude - 20,000 ft
Target velocity - M 0.9
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 735 - Range vs Time (PDAD - 0 and 10 secs)

Figure 736 - Range vs Time (PDAD - 15 and 20 secs)

Figure 737 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 738 - Range Rate vs Range (PDAD - 15 and 20 secs)

Figure 739 - Elevation Gimbal Angle vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 740 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 741 - Elevation Antenna Rate vs Range (PDAD - 15 and 20 secs)

Figure 742 - Heading Angle vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 743 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 744 - Load Factor vs Range (PDAD - 15 and 20 secs)

Figure 745 - Angle of Attack vs Time (PDAD - 0 and 10 secs)

Figure 746 - Angle of Attack vs Time (PDAD - 15 and 20 secs)

Figure 747 - Fighter Speed vs Time (PDAD - 0, 10, 15 and 20 secs)

Figure 748 - Fighter Altitude vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 749 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 750 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 15 and 20 secs)

Figure 751 - Total Lead Angle vs Range (PDAD - 0, 10, 15 and 20 secs)

Figure 752 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 753 - Rate of Change of Lead Angle vs Range (PDAD - 15 and 20 secs)

Figure 754 - Target Aspect Angle vs Range (PDAD - 0, 10, 15 and 20 secs)

FAMILY 35

Target altitude - 30,000 ft
Fighter altitude - 10,000 ft
Target velocity - M 0.9
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 755 - Range vs Time (PDAD - 0 and 10 secs)

Figure 756 - Range vs Time (PDAD - 20 and 25 secs)

Figure 757 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 758 - Range Rate vs Range (PDAD - 20 and 25 secs)

Figure 759 - Elevation Gimbal Angle vs Range (PDAD - 0, 10, 20 and 25 secs)

Figure 760 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 761 - Elevation Antenna Rate vs Range (PDAD - 20 and 25 secs)

Figure 762 - Heading Angle vs Range (PDAD - 0, 10, 20 and 25 secs)

Figure 763 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 764 - Load Factor vs Range (PDAD - 20 and 25 secs)

Figure 765 - Angle of Attack vs Time (PDAD - 0 and 10 secs)

Figure 766 - Angle of Attack vs Time (PDAD - 20 and 25 secs)

Figure 767 - Fighter Speed vs Time (PDAD - 0, 10, 20 and 25 secs)

Figure 768 - Fighter Altitude vs Range (PDAD - 0, 10, 20 and 25 secs)

Figure 769 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 770 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 and 25 secs)

Figure 771 - Total Lead Angle vs Range (PDAD - 0, 10, 20 and 25 secs)

Figure 772 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 773 - Rate of Change of Lead Angle vs Range (PDAD - 20 and 25 secs)

Figure 774 - Target Aspect Angle vs Range (PDAD - 0, 10, 20 and 25 secs)

FAMILY 36

Target altitude - 30,000
Fighter altitude - sea level
Target velocity - M 0.9
Fighter velocity - V_{max}

Pull-up Delay After Detection = PDAD (Variable)

Figure 775 - Range vs Time (PDAD - 0 and 10 secs)

Figure 776 - Range vs Time (PDAD - 20 and 25 secs)

Figure 777 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 778 - Range Rate vs Range (PDAD - 20 and 25 secs)

Figure 779 - Elevation Gimbal Angle vs Range (PDAD - 0, 10, 20 and 25 secs)

Figure 780 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 781 - Elevation Antenna Rate vs Range (PDAD - 20 and 25 secs)

Figure 782 - Heading Angle vs Range (PDAD - 0, 10, 20 and 25 secs)

Figure 783 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 784 - Load Factor vs Range (PDAD - 20 and 25 secs)

Figure 785 - Angle of Attack vs Time (PDAD - 0 and 10 secs)

Figure 786 - Angle of Attack vs Time (PDAD - 20 and 25 secs)

Figure 787 - Fighter Speed vs Time (PDAD - 0, 10, 20 and 25 secs)

Figure 788 - Fighter Altitude vs Range (PDAD - 0, 10, 20 and 25 secs)

Figure 789 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 790 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 and 25 secs)

Figure 791 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 792 - Total Lead Angle vs Range (PDAD - 20 and 25 secs)

Figure 793 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 794 - Rate of Change of Lead Angle vs Range (PDAD - 20 and 25 secs)

Figure 795 - Target Aspect Angle vs Range (PDAD - 0 and 10 secs)

Figure 796 - Target Aspect Angle vs Range (PDAD - 20 and 25 secs)

FAMILY 37

Target altitude - 30,000 ft
Fighter altitude - 20,000 ft
Target velocity - M 0.9
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 797 - Range vs Time (PDAD - 0 and 10 secs)

Figure 798 - Range vs Time (PDAD - 20 and 30 secs)

Figure 799 - Range vs Time (PDAD - 35 secs)

Figure 800 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 801 - Range Rate vs Range (PDAD - 20 and 30 secs)

Figure 802 - Range Rate vs Range (PDAD - 35 secs)

Figure 803 - Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 804 - Elevation Gimbal Angle vs Range (PDAD - 20 and 30 secs)

Figure 805 - Elevation Gimbal Angle vs Range (PDAD - 35 secs)

Figure 806 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 807 - Elevation Antenna Rate vs Range (PDAD - 20 and 30 secs)

Figure 808 - Elevation Antenna Rate vs Range (PDAD - 35 secs)

Figure 809 - Heading Angle vs Range (PDAD - 0, 10, 20, 30 and 35 secs)

Figure 810 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 811 - Load Factor vs Range (PDAD - 20 and 30 secs)

Figure 812 - Load Factor vs Range (PDAD - 35 secs)

Figure 813 - Angle of Attack vs Time (PDAD - 0 and 10 secs)

Figure 814 - Angle of Attack vs Time (PDAD - 20, 30 and 35 secs)

Figure 815 - Fighter Speed vs Time (PDAD - 0, 10, 20, 30 and 35 secs)

Figure 816 - Fighter Altitude vs Range (PDAD - 0, 10, 20, 30 and 35 secs)

Figure 817 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 818 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 and 30 secs)

Figure 819 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 35 secs)

Figure 820 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 821 - Total Lead Angle vs Range (PDAD - 20 and 30 secs)

Figure 822 - Total Lead Angle vs Range (PDAD - 35 secs)

Figure 823 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 824 - Rate of Change of Lead Angle vs Range (PDAD - 20 and 30 secs)

Figure 825 - Rate of Change of Lead Angle vs Range (PDAD - 35 secs)

Figure 826 - Target Aspect Angle vs Range (PDAD - 0, 10, 20, 30 and 35 secs)

FAMILY 38

Target altitude - 30,000 ft
Fighter altitude - 10,000 ft
Target velocity - M 0.9
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 827 - Range vs Time (PDAD - 0 and 10 secs)

Figure 828 - Range vs Time (PDAD - 20 and 30 secs)

Figure 829 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 830 - Range Rate vs Range (PDAD - 20 and 30 secs)

Figure 831 - Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 832 - Elevation Gimbal Angle vs Range (PDAD - 20 and 30 secs)

Figure 833 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 834 - Elevation Antenna Rate vs Range (PDAD - 20 and 30 secs)

Figure 835 - Heading Angle vs Range (PDAD - 0, 10, 20 and 30 secs)

Figure 836 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 837 - Load Factor vs Range (PDAD - 20 and 30 secs)

Figure 838 - Angle of Attack vs Time (PDAD - 0 and 10 secs)

Figure 839 - Angle of Attack vs Time (PDAD - 20 and 30 secs)

Figure 840 - Fighter Speed vs Time (PDAD - 0, 10, 20 and 30 secs)

Figure 841 - Fighter Altitude vs Range (PDAD - 0 and 10 secs)

Figure 842 - Fighter Altitude vs Range (PDAD - 20 and 30 secs)

Figure 843 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 844 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 and 30 secs)

Figure 845 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 846 - Total Lead Angle vs Range (PDAD - 20 and 30 secs)

Figure 847 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 848 - Rate of Change of Lead Angle vs Range (PDAD - 20 and 30 secs)

Figure 849 - Target Aspect Angle vs Range (PDAD - 0, 10, 20 and 30 secs)

FAMILY 39

Target altitude - 30,000 ft
Fighter altitude - sea level
Target velocity - M 0.9
Fighter velocity - V_{cruise}

Pull-up Delay After Detection = PDAD (Variable)

Figure 850 - Range vs Time (PDAD - 0 and 10 secs)

Figure 851 - Range vs Time (PDAD - 20 and 25 secs)

Figure 852 - Range vs Time (PDAD - 30 secs)

Figure 853 - Range Rate vs Range (PDAD - 0 and 10 secs)

Figure 854 - Range Rate vs Range (PDAD - 20 and 25 secs)

Figure 855 - Range Rate vs Range (PDAD - 30 secs)

Figure 856 - Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 857 - Elevation Gimbal Angle vs Range (PDAD - 20, 25 and 30 secs)

Figure 858 - Elevation Antenna Rate vs Range (PDAD - 0 and 10 secs)

Figure 859 - Elevation Antenna Rate vs Range (PDAD - 20 and 25 secs)

Figure 860 - Elevation Antenna Rate vs Range (PDAD - 30 secs)

Figure 861 - Heading Angle vs Range (PDAD - 0, 10, 20, 25 and 30 secs)

Figure 862 - Load Factor vs Range (PDAD - 0 and 10 secs)

Figure 863 - Load Factor vs Range (PDAD - 20 and 25 secs)

Figure 864 - Load Factor vs Range (PDAD - 30 secs)

Figure 865 - Angle of Attack vs Time (PDAD - 0 and 10 secs)

Figure 866 - Angle of Attack vs Time (PDAD - 20 and 25 secs)

Figure 867 - Angle of Attack vs Time (PDAD - 30 secs)

Figure 868 - Fighter Speed vs Time (PDAD - 0, 10, 20, 25 and 30 secs)

Figure 869 - Fighter Altitude vs Range (PDAD - 0 and 10 secs)

Figure 870 - Fighter Altitude vs Range (PDAD - 20 and 25 secs)

Figure 871 - Fighter Altitude vs Range (PDAD - 30 secs)

Figure 872 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 0 and 10 secs)

Figure 873 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 20 and 25 secs)

Figure 874 - Rate of Change of Elevation Gimbal Angle vs Range (PDAD - 30 secs)

Figure 875 - Total Lead Angle vs Range (PDAD - 0 and 10 secs)

Figure 876 - Total Lead Angle vs Range (PDAD - 20 and 25 secs)

Figure 877 - Total Lead Angle vs Range (PDAD - 30 secs)

Figure 878 - Rate of Change of Lead Angle vs Range (PDAD - 0 and 10 secs)

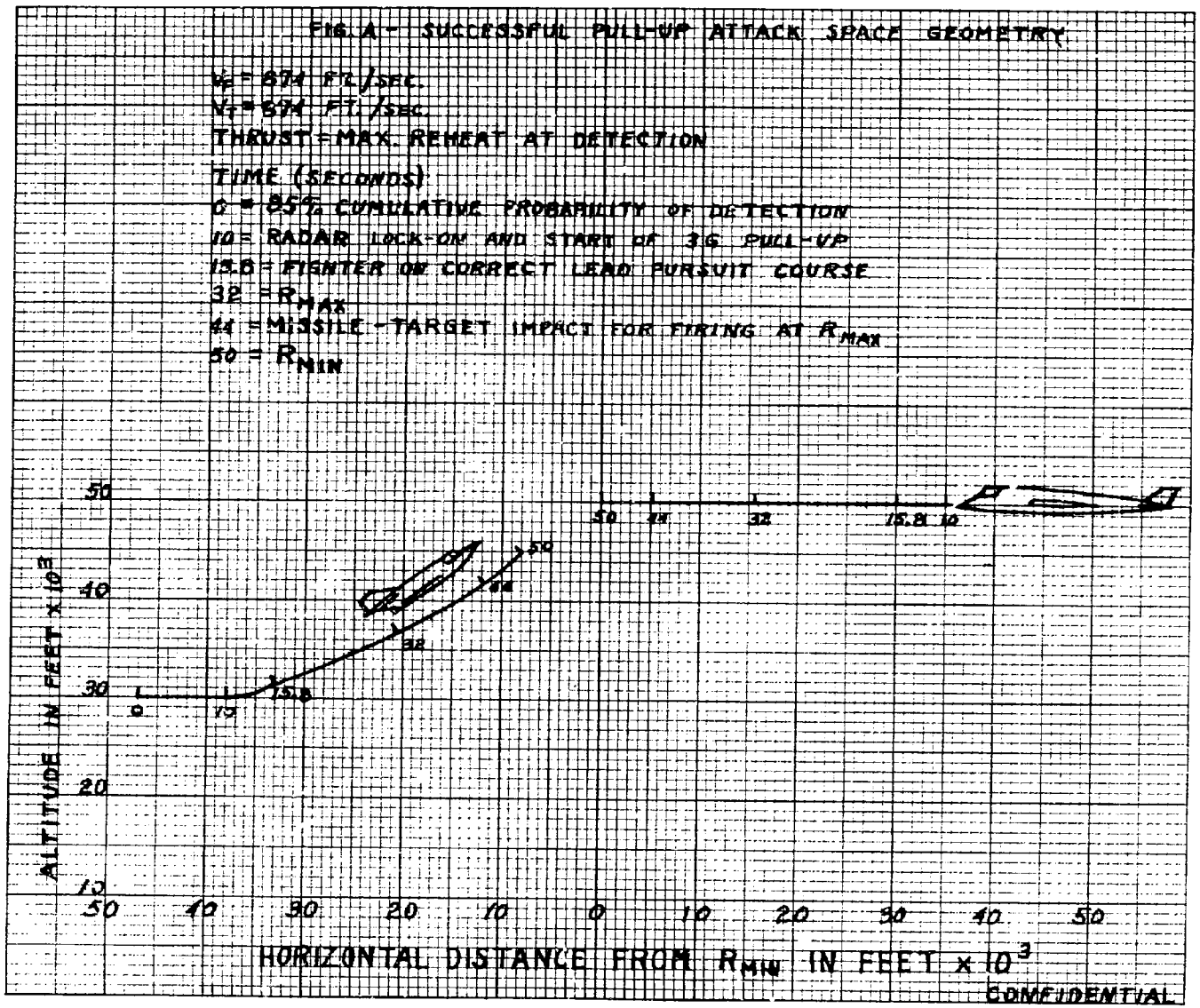
Figure 879 - Rate of Change of Lead Angle vs Range (PDAD - 20 and 25 secs)

Figure 880 - Rate of Change of Lead Angle vs Range (PDAD - 30 secs)

Figure 881 - Target Aspect Angle vs Range (PDAD - 0, 10, 20, 25 and 30 secs)

FIG. A - SUCCESSFUL PULL-UP ATTACK SPACE GEOMETRY

V_F = 674 FT./SEC.
V_T = 674 FT./SEC.
THRUST = MAX. REHEAT AT DETECTION
TIME (SECONDS)
0 = 85% CUMULATIVE PROBABILITY OF DETECTION
10 = RADAR LOCK-ON AND START OF 3G PULL-UP
15.8 = FIGHTER ON CORRECT LEAD PURSUIT COURSE
32 = R_{MAX}
44 = MISSILE - TARGET IMPACT FOR FIRING AT R_{MAX}
50 = R_{MIN}



CONFIDENTIAL

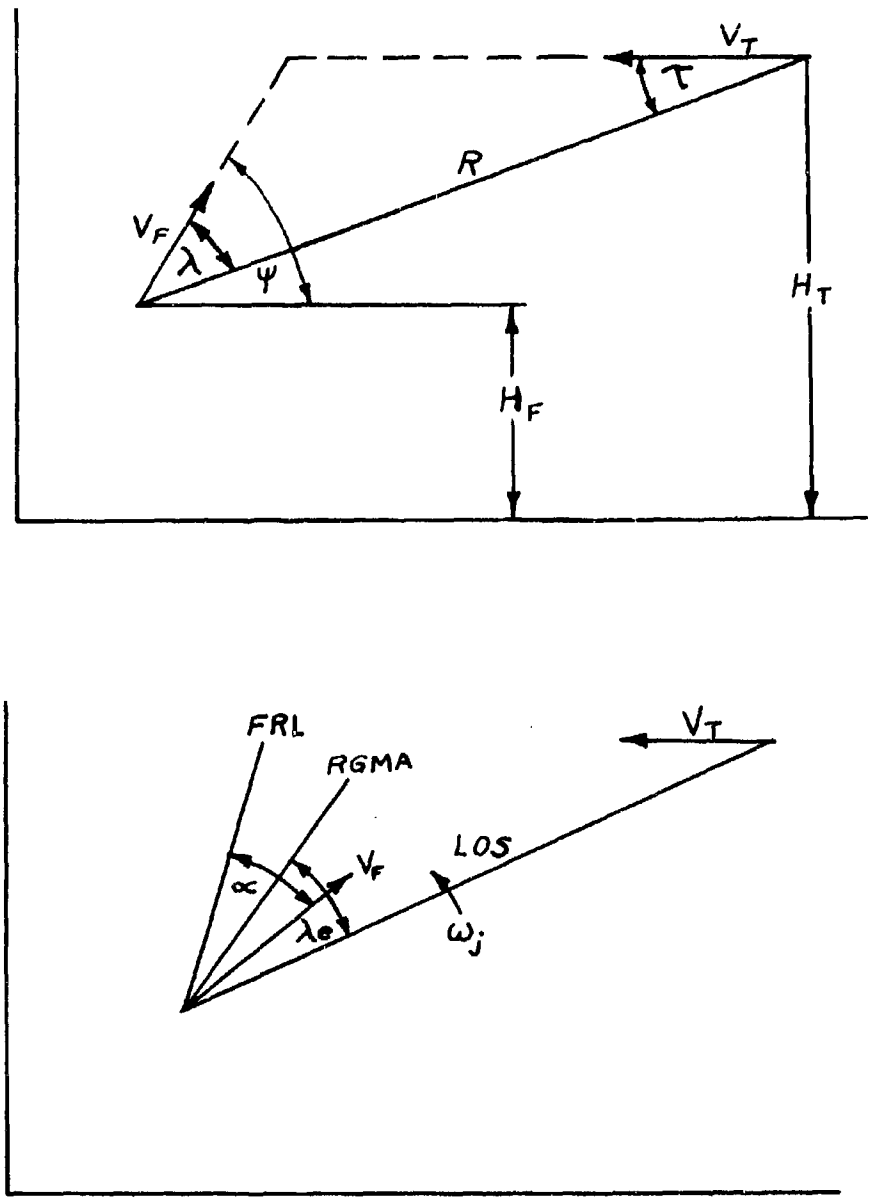


FIG. B - PULL-UP ATTACK GEOMETRY AND AIRCRAFT COORDINATE SYSTEM

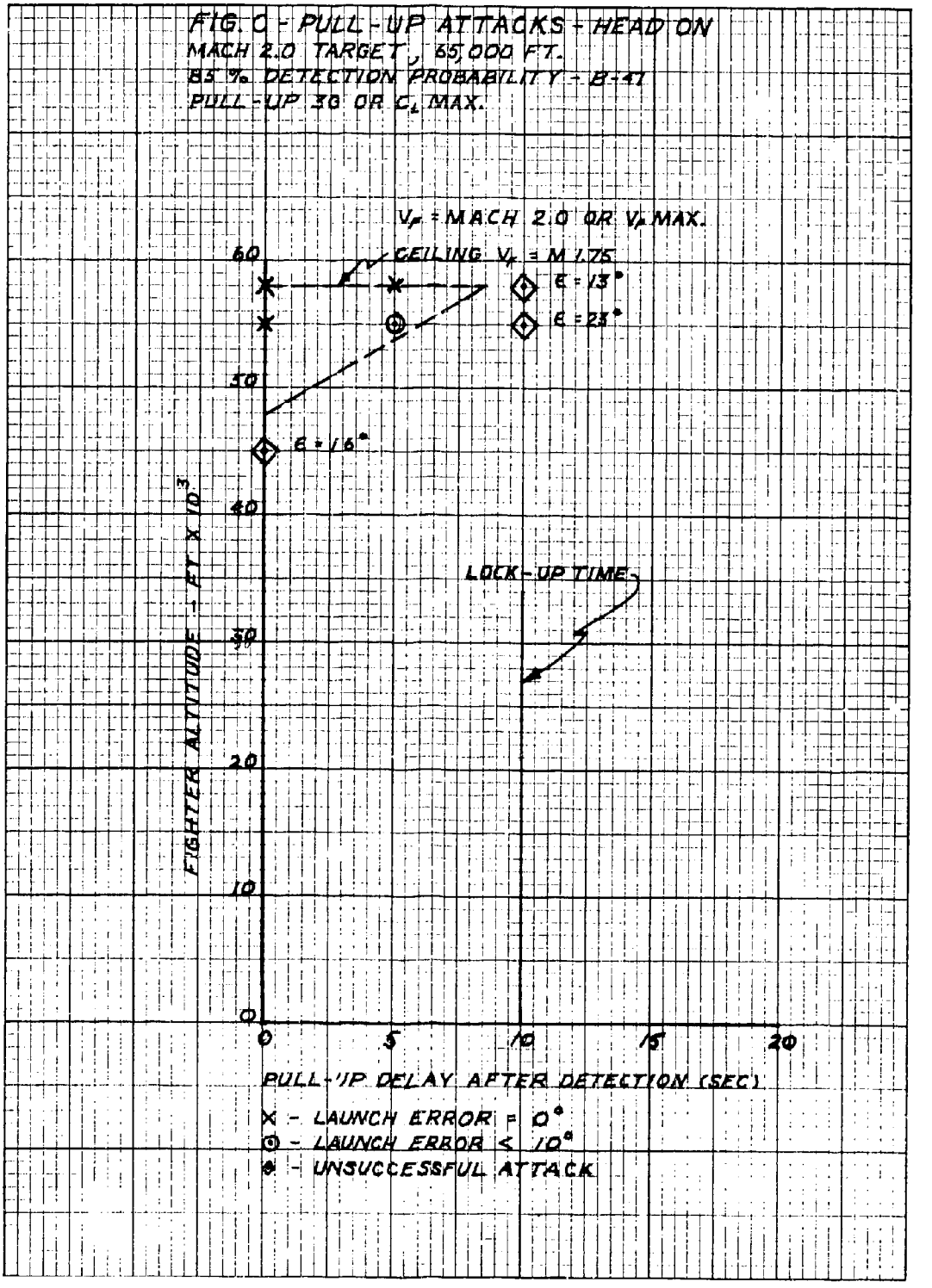
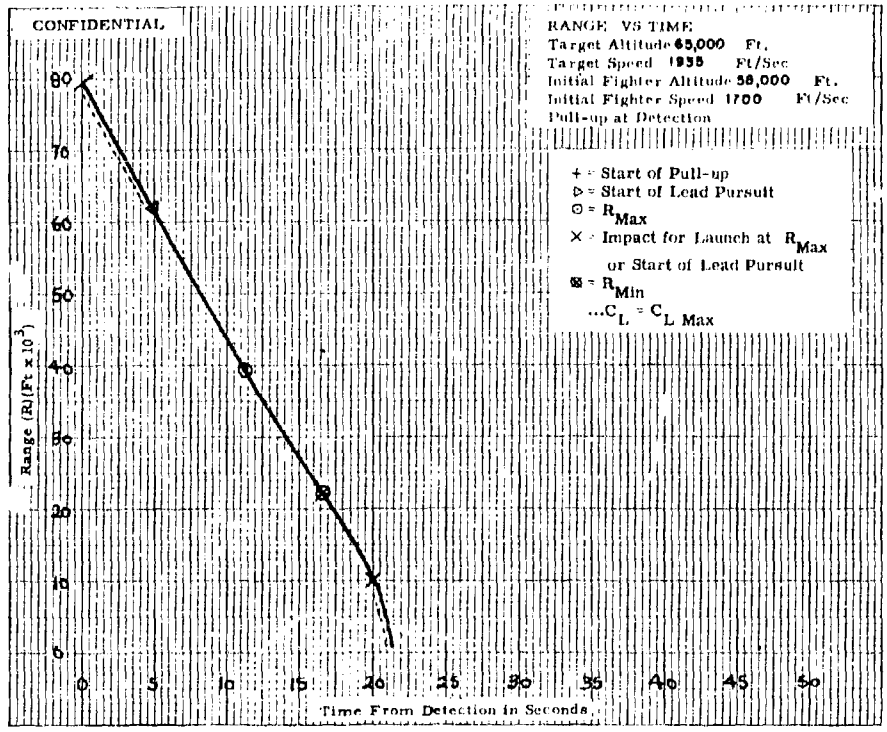


FIG. C - PULL-UP ATTACKS - HEAD ON
MACH 2.0 TARGET, 65,000 FT.
85 % DETECTION PROBABILITY - B-47
PULL-UP 3G OR C_L MAX.
V_F = MACH 2.0 OR V_L MAX.
CEILING V_F = M 1.75
ε = 13°
ε = 23°
ε = 16°
LOCK-UP TIME
FIGHTER ALTITUDE - FT X 10^3
60
50
40
30
20
10
0
0
5
10
15
20
PULL-UP DELAY AFTER DETECTION (SEC)
X - LAUNCH ERROR = 0°
⊙ - LAUNCH ERROR ≤ 10°
✱ - UNSUCCESSFUL ATTACK


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

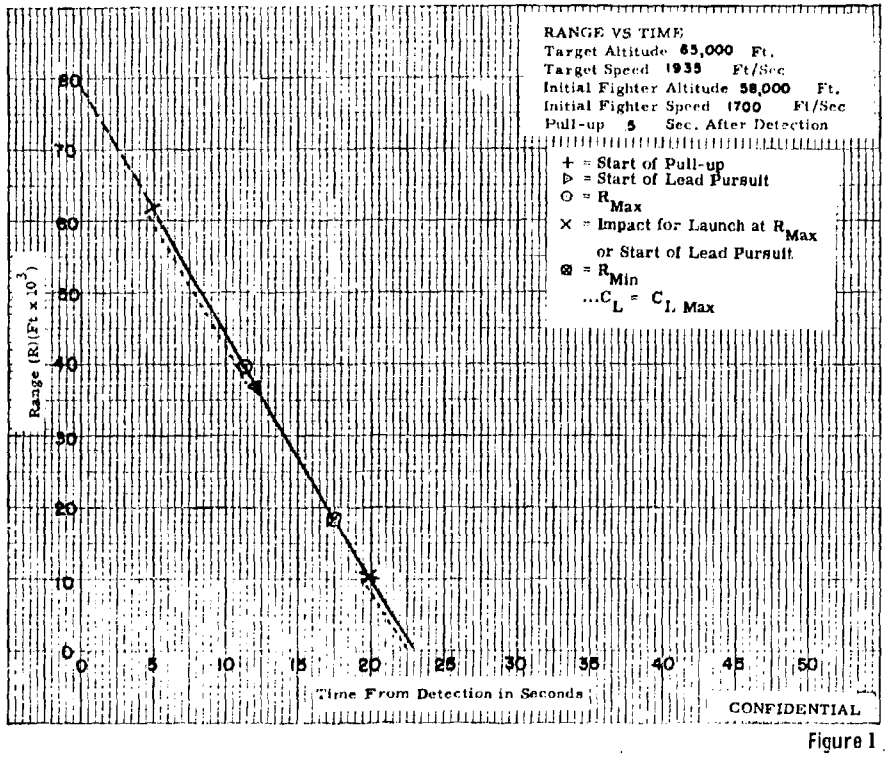
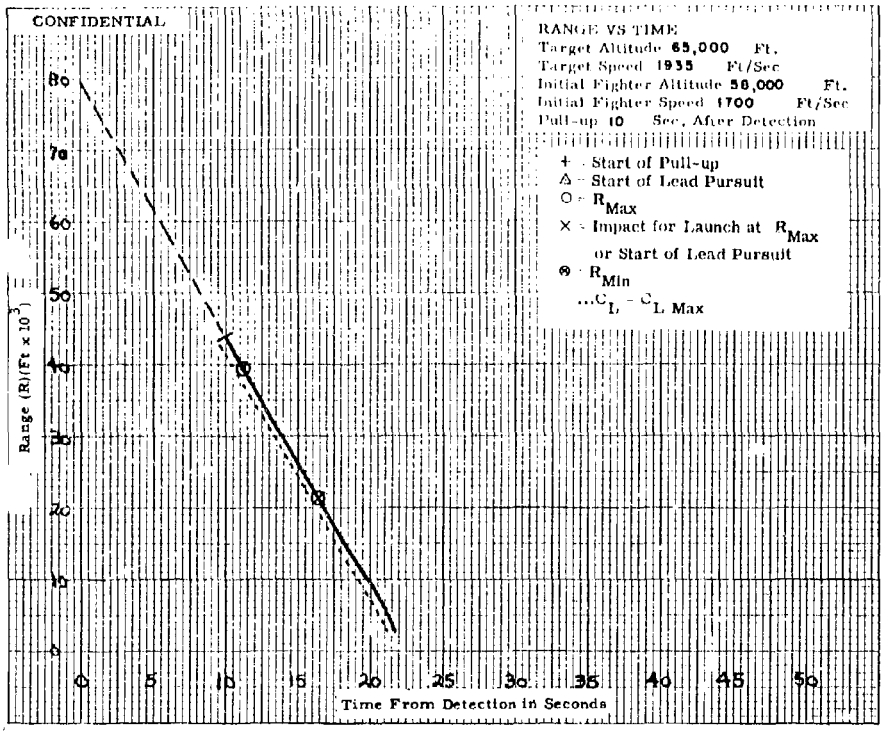

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 5 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 1


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 10 Sec. After Detection
+ - Start of Pull-up
Δ - Start of Lead Pursuit
○ - R_{Max}
× - Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ - R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

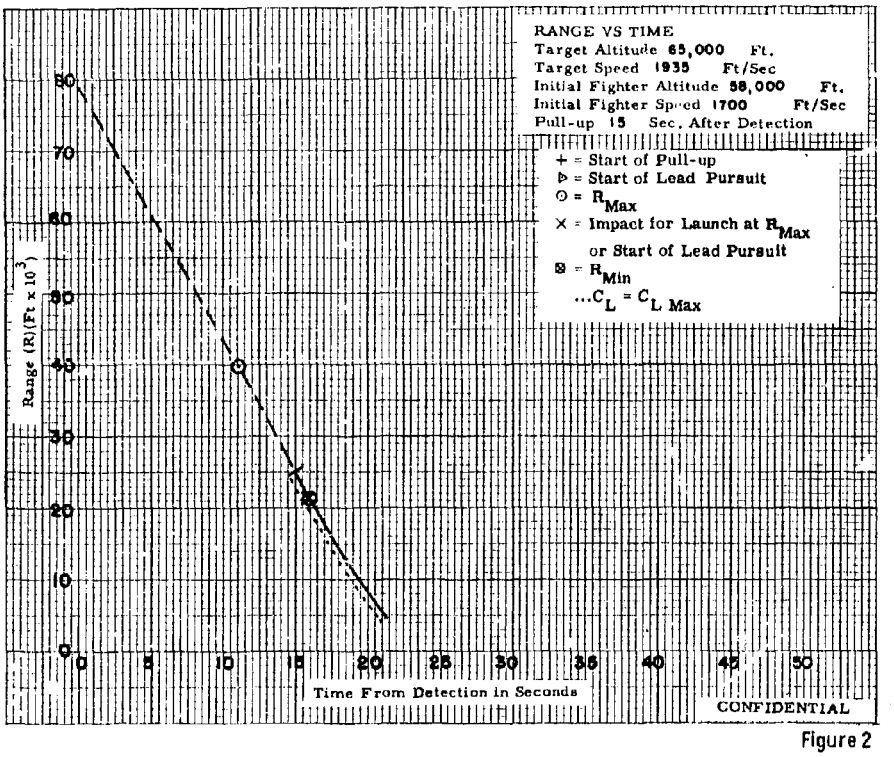
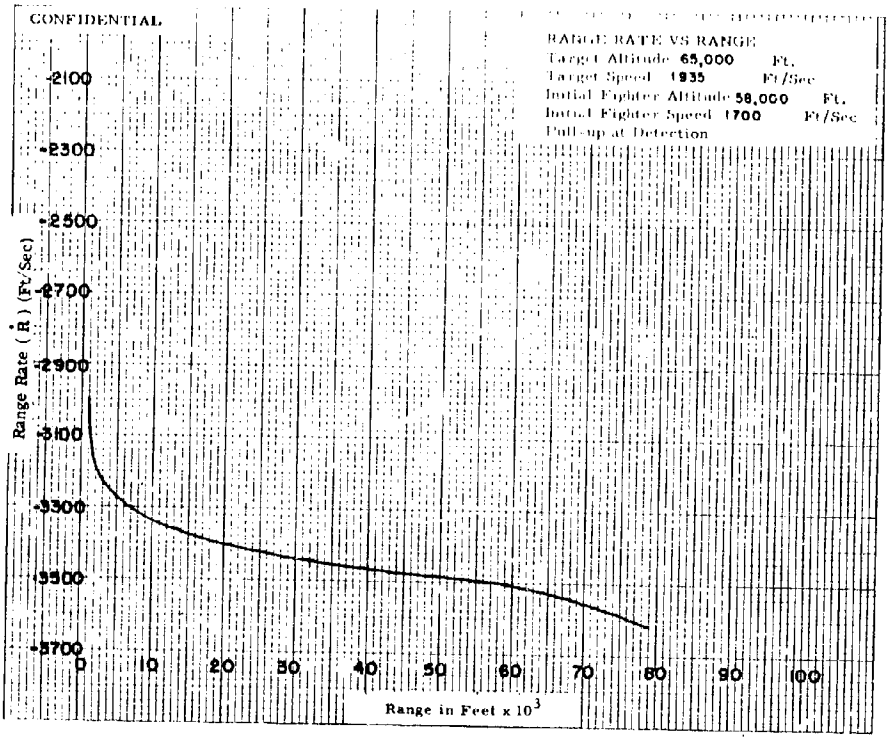

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 2


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ) (Ft/Sec)
-2100
-2300
-2500
-2700
-2900
-3100
-3300
-3500
-3700
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

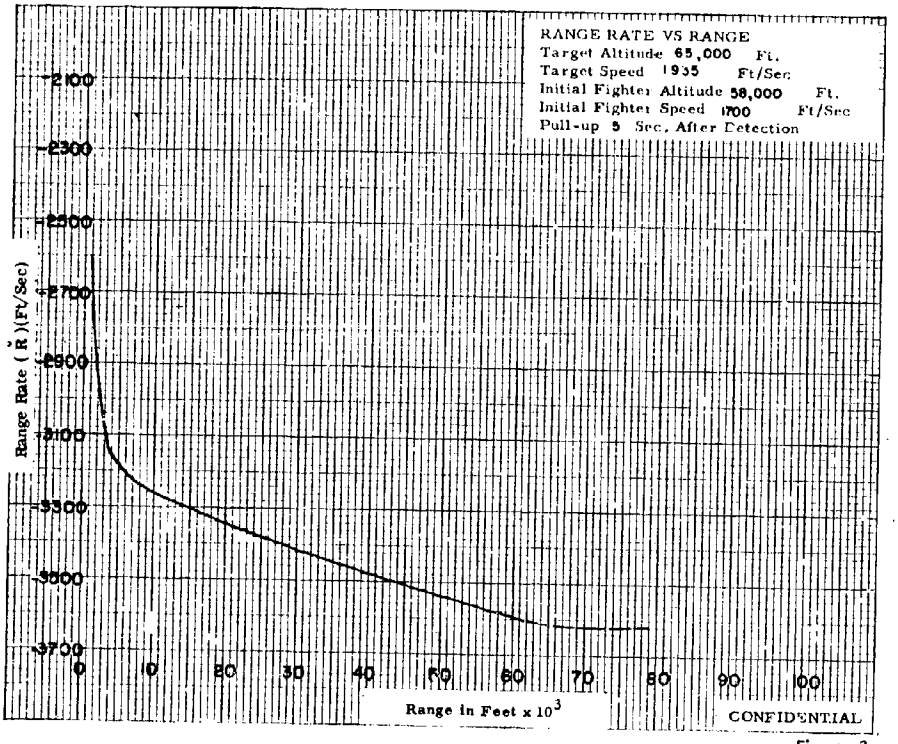
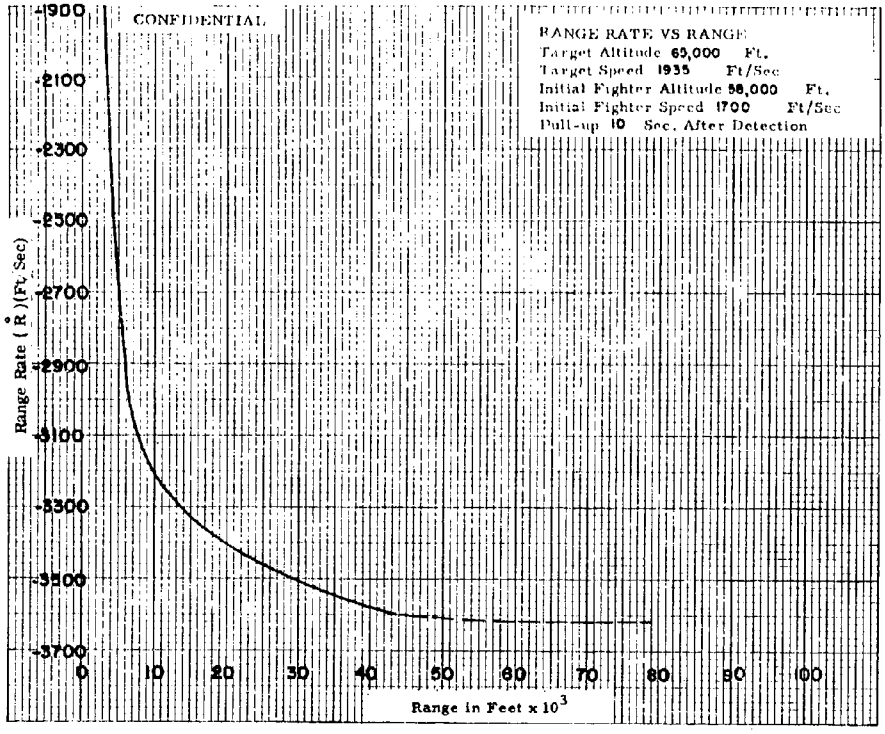

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 5 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
-2100
-2300
-2500
-2700
-2900
-3100
-3300
-3500
-3700
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 3.


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 60,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
-1900
-2100
-2300
-2500
-2700
-2900
-3100
-3300
-3500
-3700
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

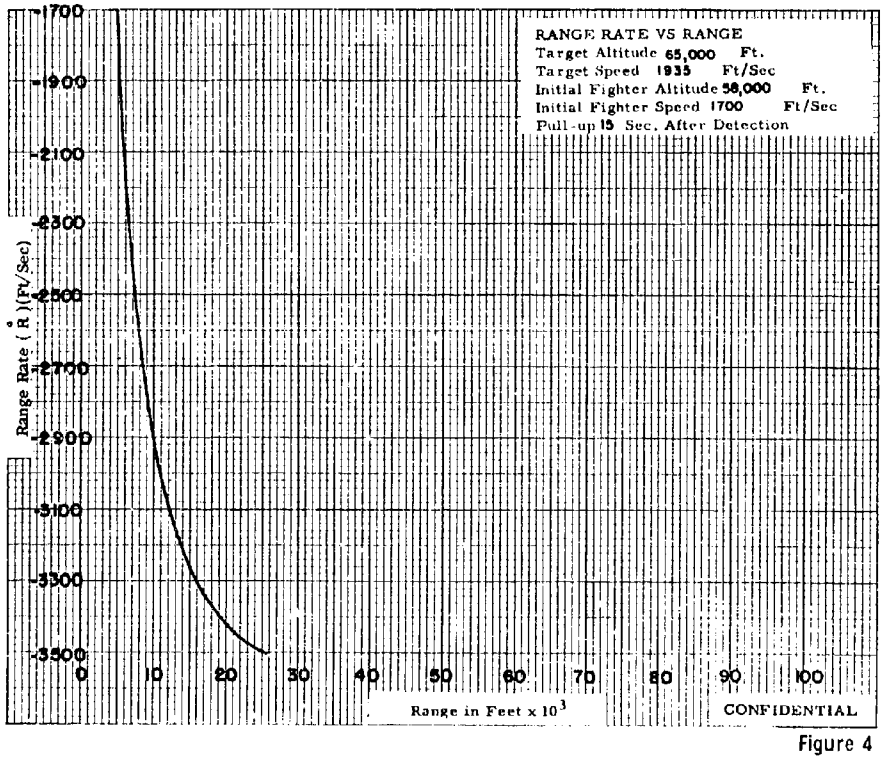

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 15 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
-1700
-1900
-2100
-2300
-2500
-2700
-2900
-3100
-3300
-3500
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
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Figure 4

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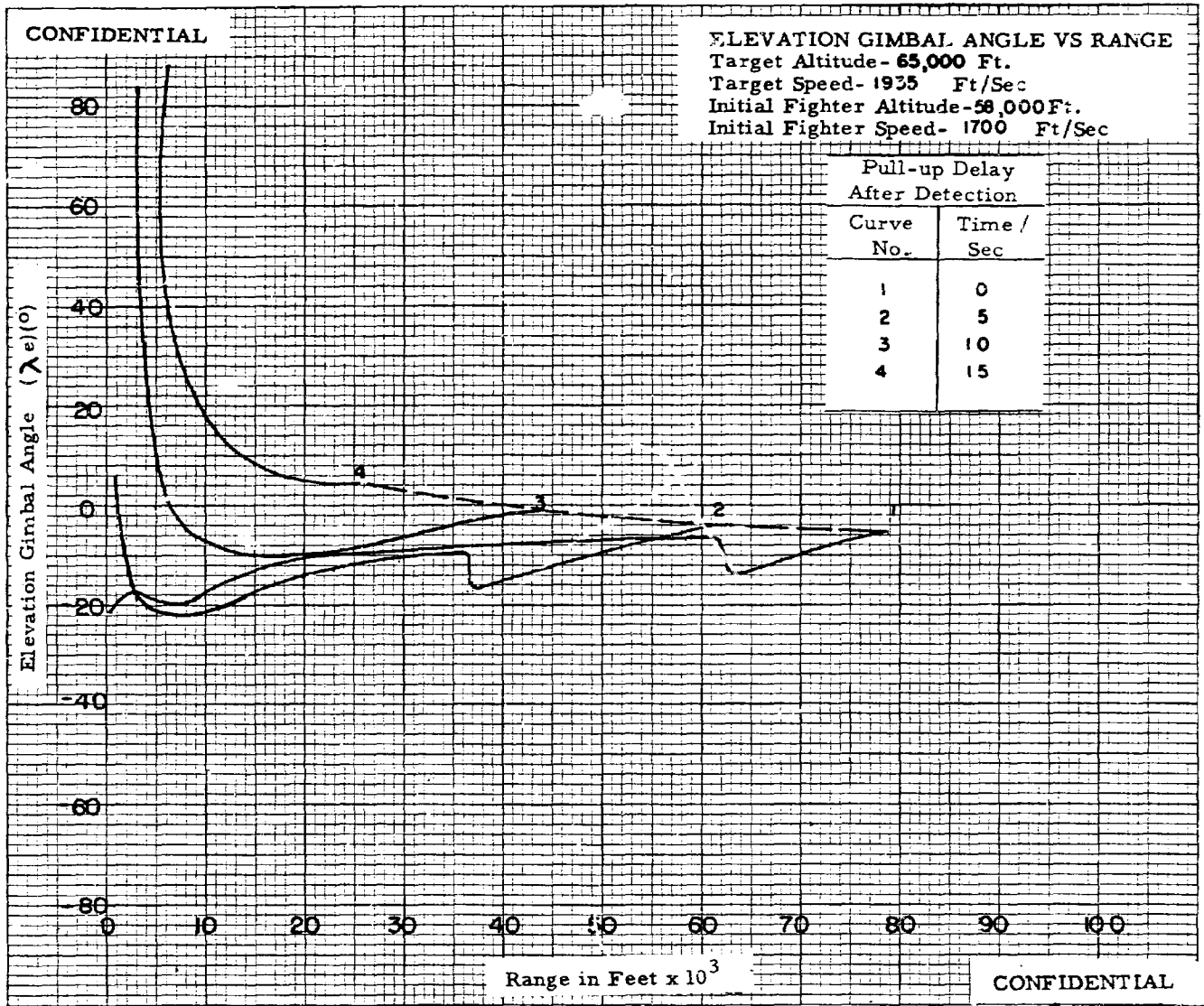

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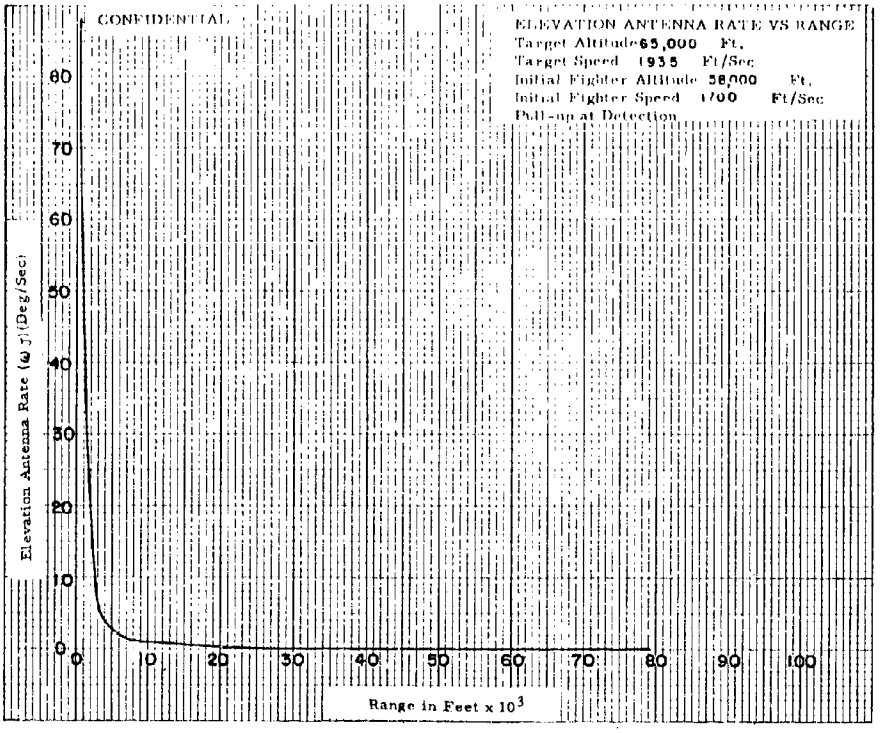

CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up at Detection
Elevation Antenna Rate (ω_J)(Deg/Sec)
Range in Feet x 10^3

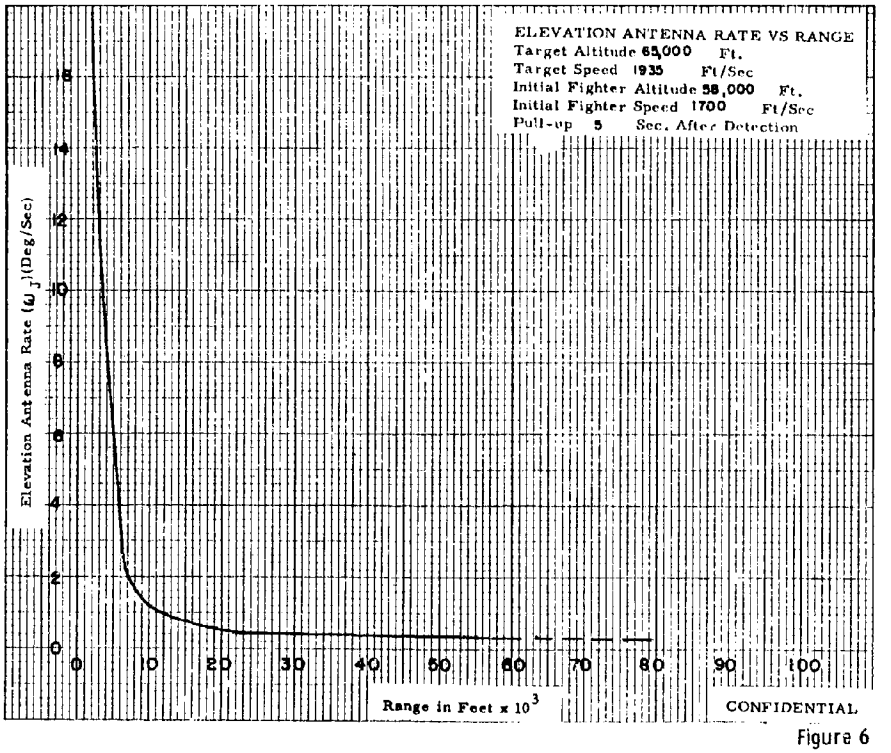
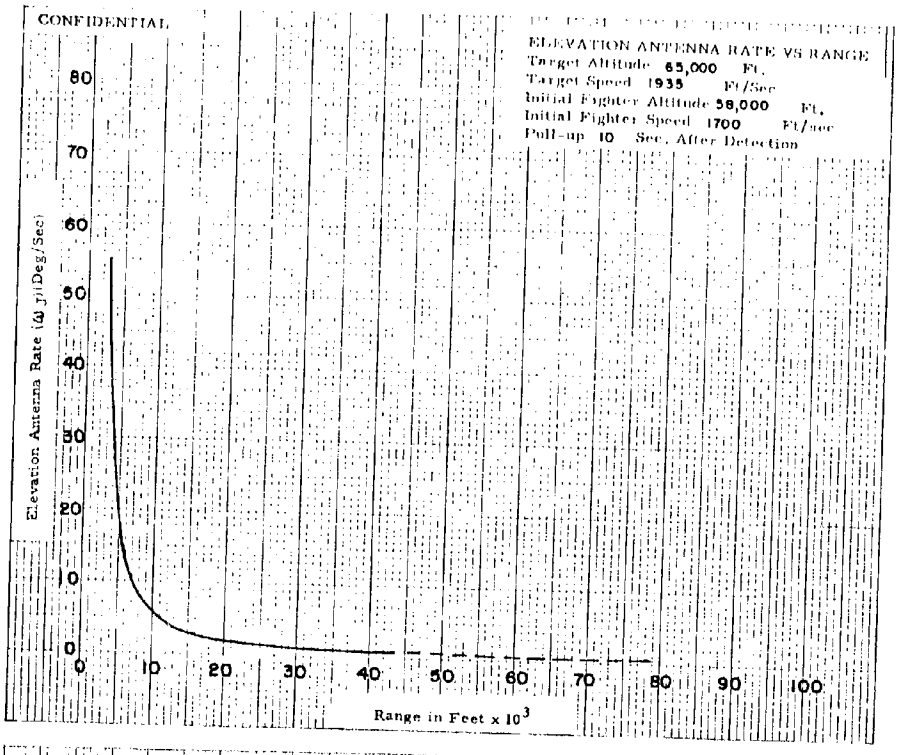

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 5 Sec. After Detection
Elevation Antenna Rate (ω_J)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 6


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/sec
Pull-up 10 Sec. After Detection
Elevation Antenna Rate (ω J)(Deg/Sec)
Range in Feet x 10^3

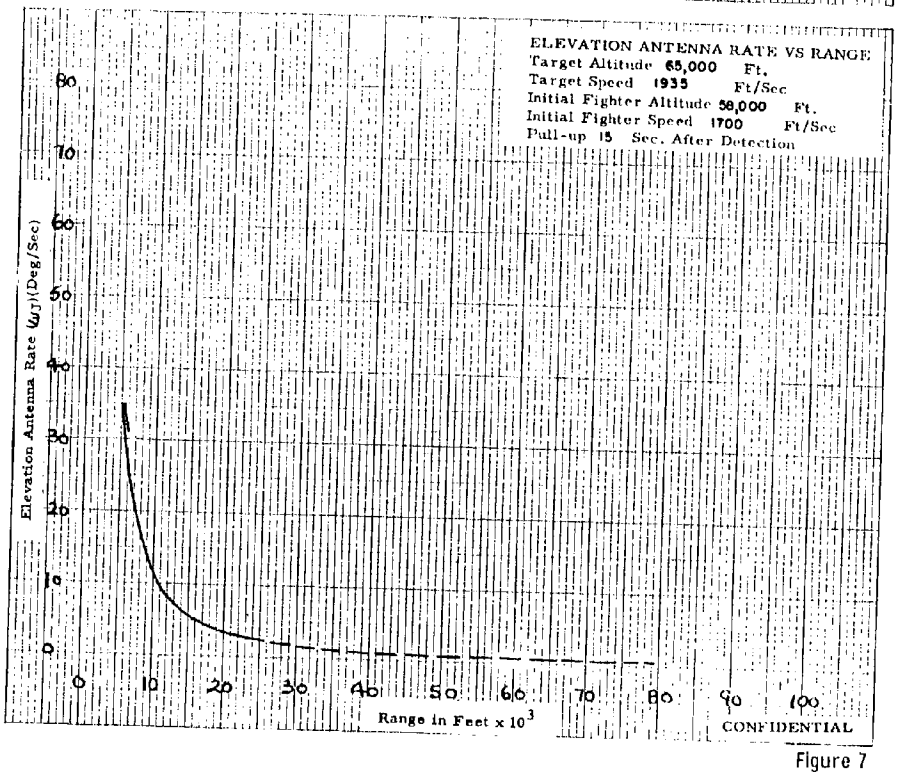
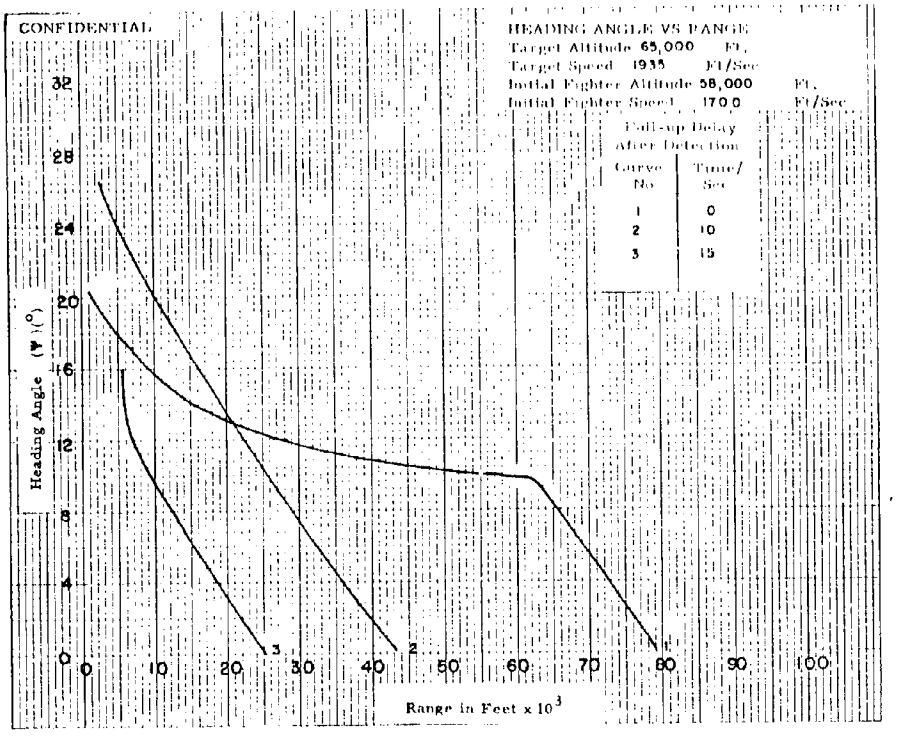

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 15 Sec. After Detection
Elevation Antenna Rate (ω J)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 7


CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up Delay After Detection
Curve No
Time/ Sec
1 0
2 10
3 15
Heading Angle (Ψ)(°)
Range in Feet x 10^3
0 4 8 12 16 20 24 28 32
0 10 20 30 40 50 60 70 80 90 100
1
2
3

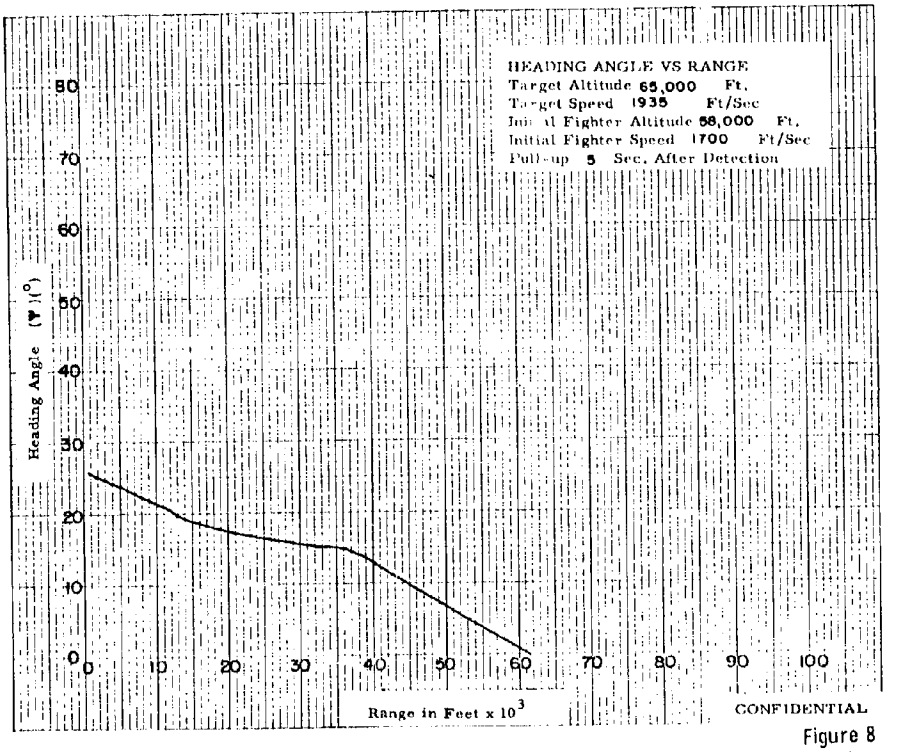
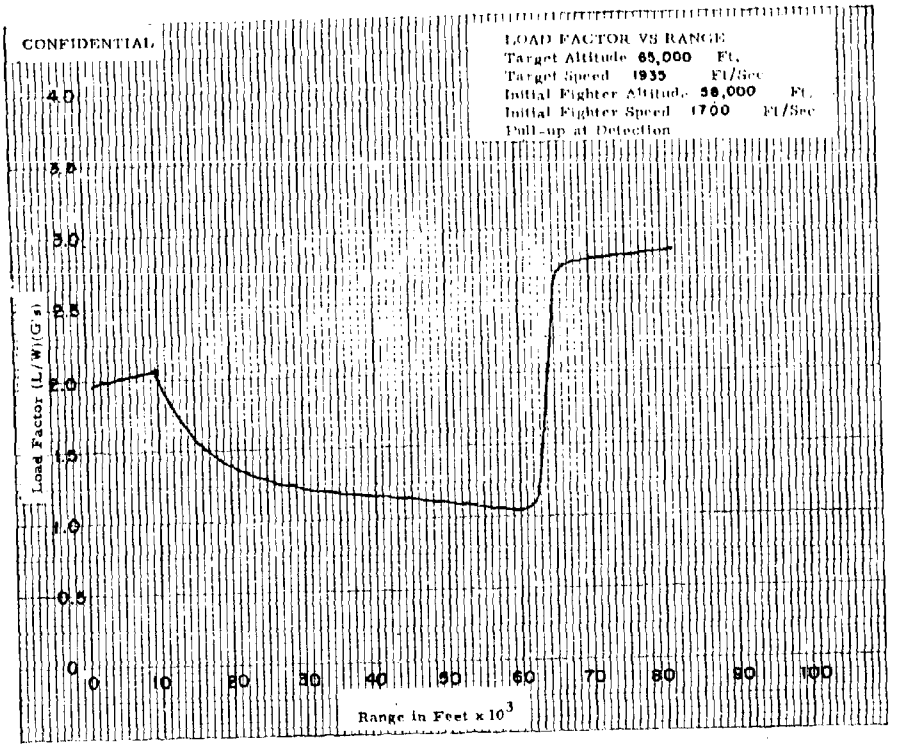

HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 5 Sec. After Detection
Heading Angle (Ψ)(°)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80
0 10 20 30 40 50 60 70 80 90 100
CONFIDENTIAL

Figure 8


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

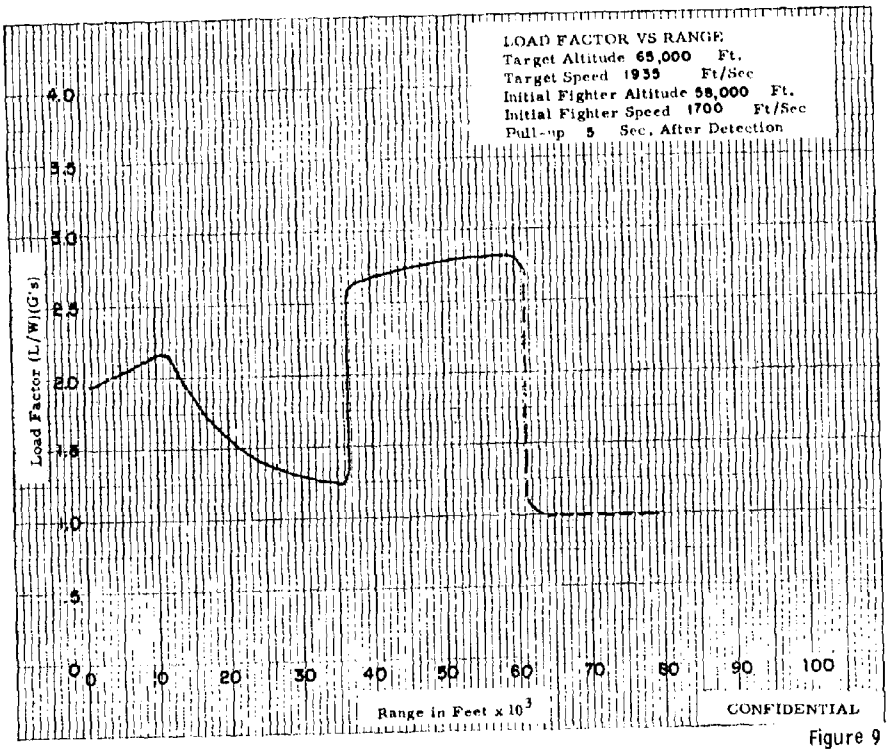
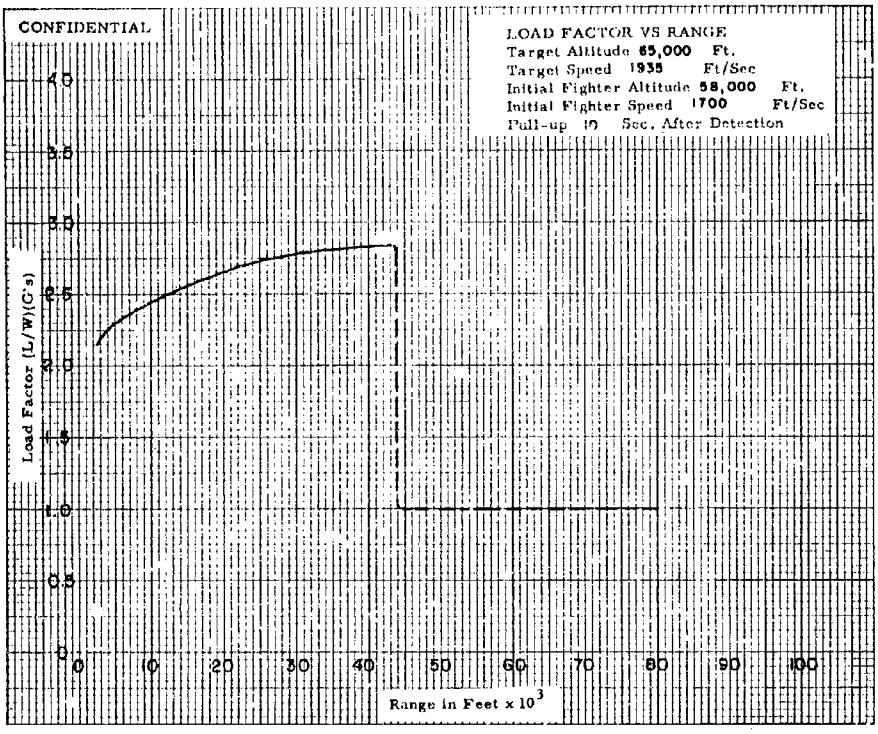

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 5 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 9


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

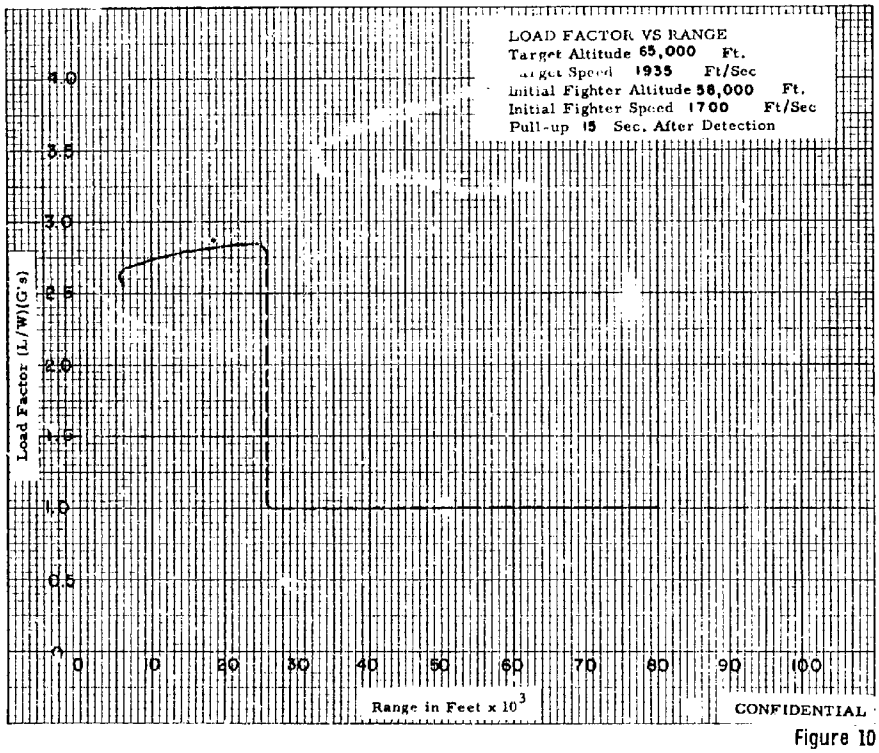
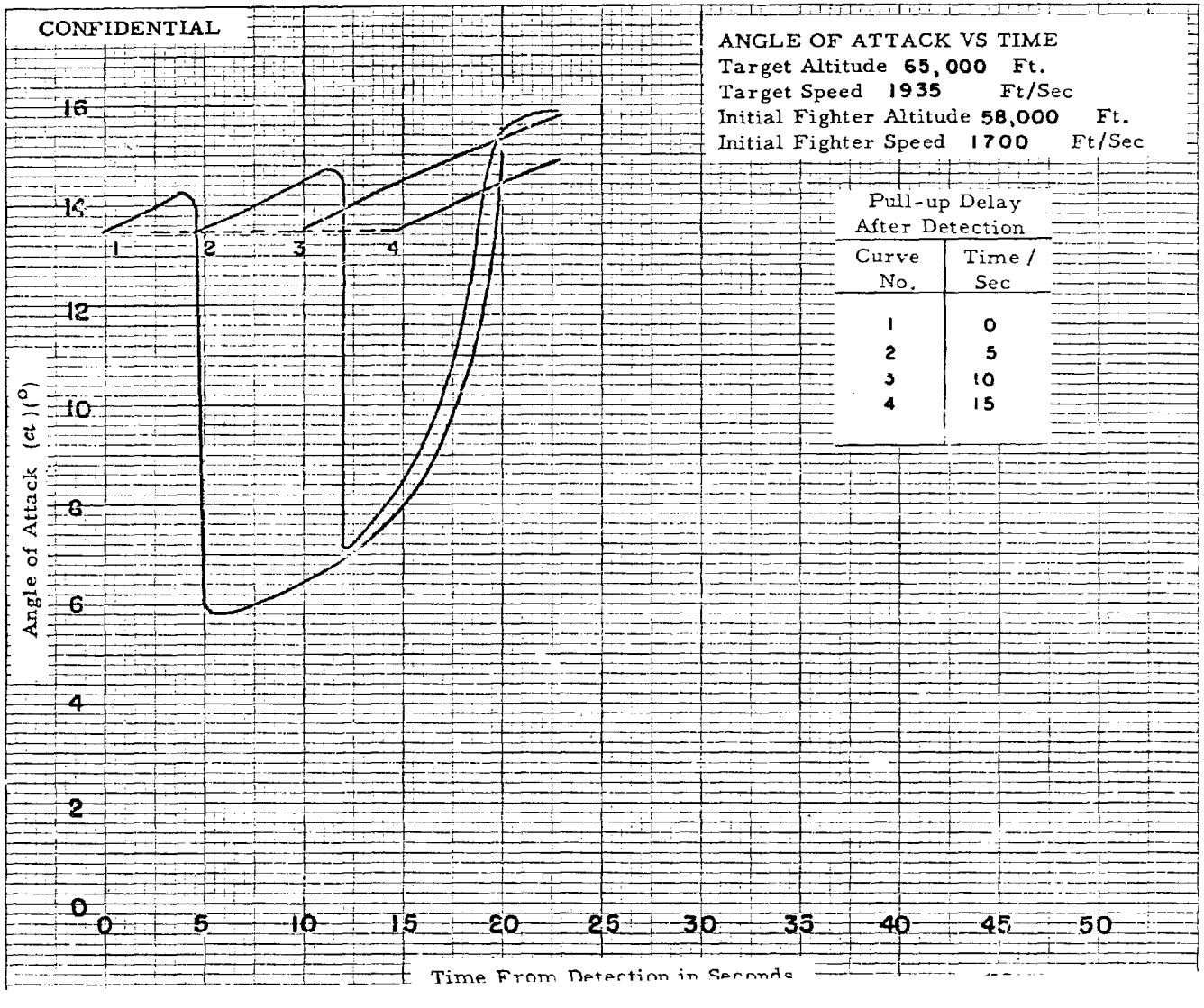
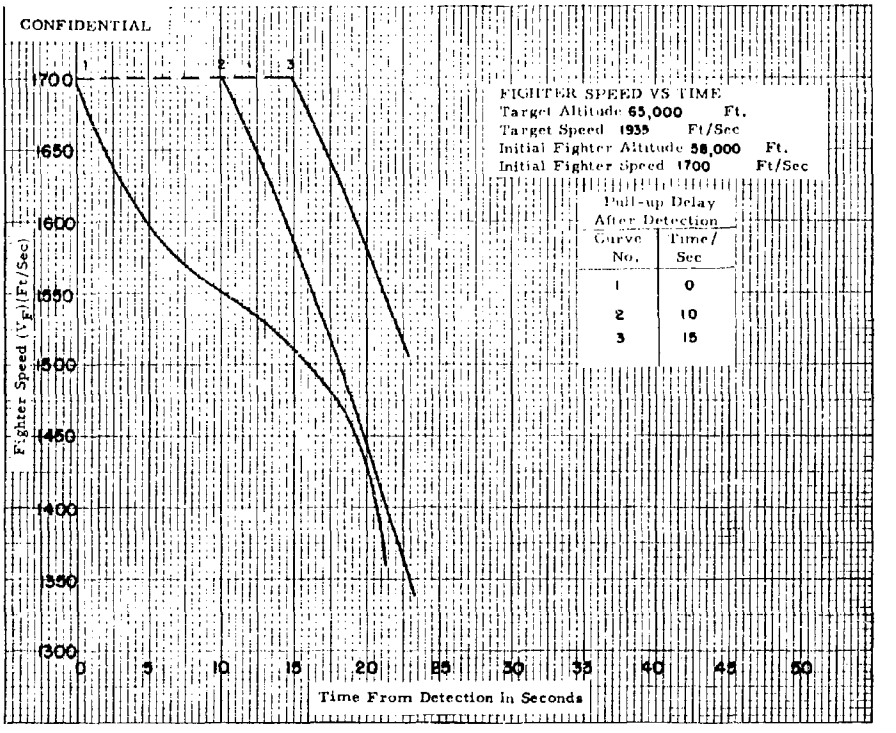

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 15 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 10

CONFIDENTIAL




FIGHTER SPEED VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
3 | 15
Fighter Speed (V_F) (Ft/Sec)
1700
1650
1600
1550
1500
1450
1400
1350
1300
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds

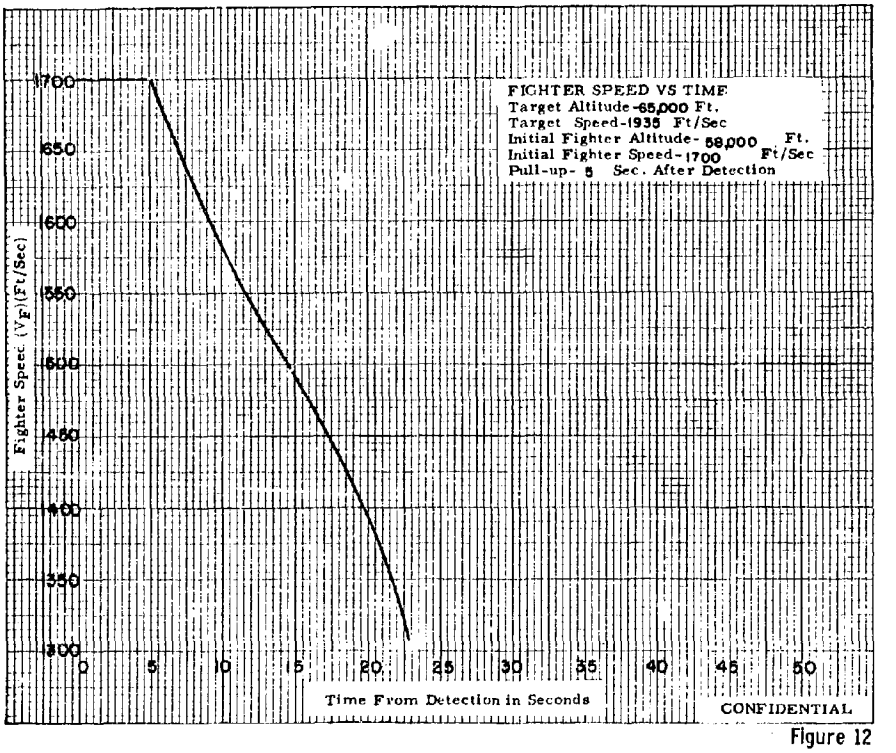
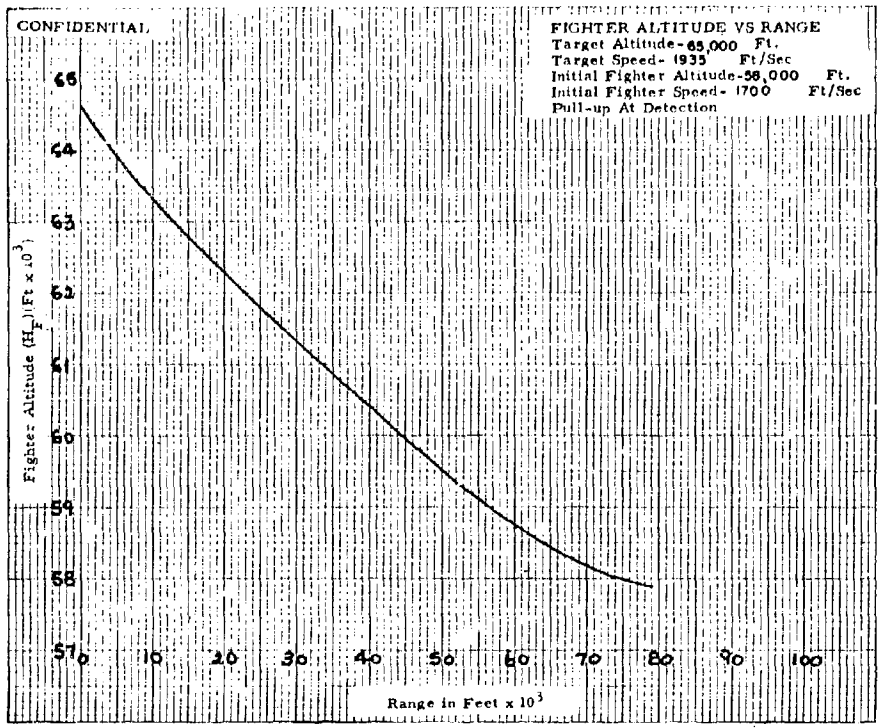

FIGHTER SPEED VS TIME
Target Altitude-65,000 Ft.
Target Speed-1935 Ft/Sec
Initial Fighter Altitude- 58,000 Ft.
Initial Fighter Speed-1700 Ft/Sec
Pull-up- 5 Sec. After Detection
Fighter Speed (V_F) (Ft/Sec)
1700
1650
1600
1550
1500
1450
1400
1350
1300
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds

Figure 12


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed- 1700 Ft/Sec
Pull-up At Detection
Fighter Altitude (H_F)(Ft x 10^3)
66
64
63
62
61
60
59
58
57
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

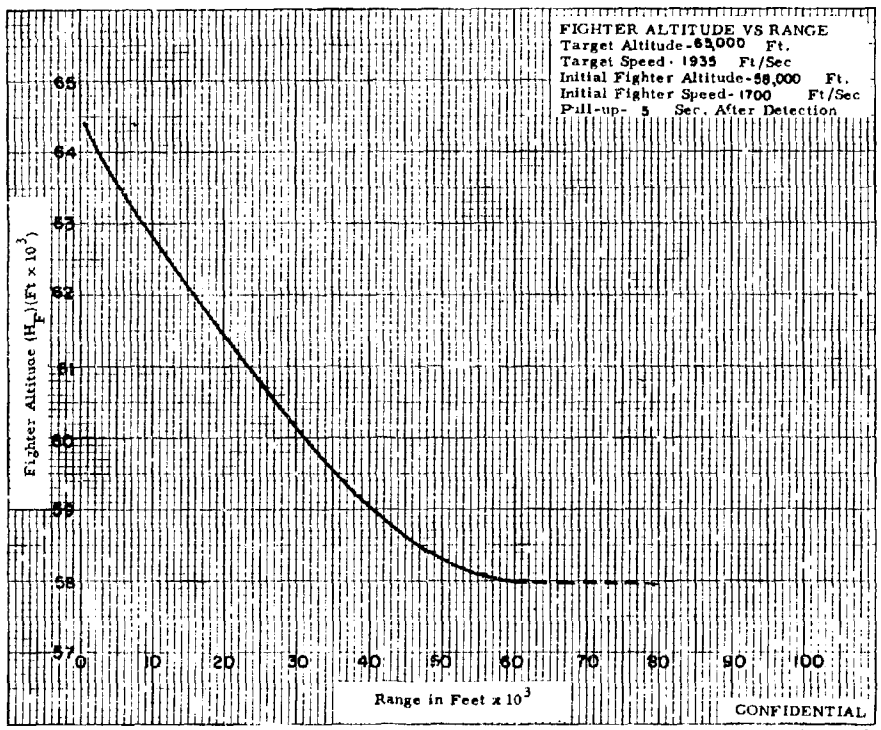
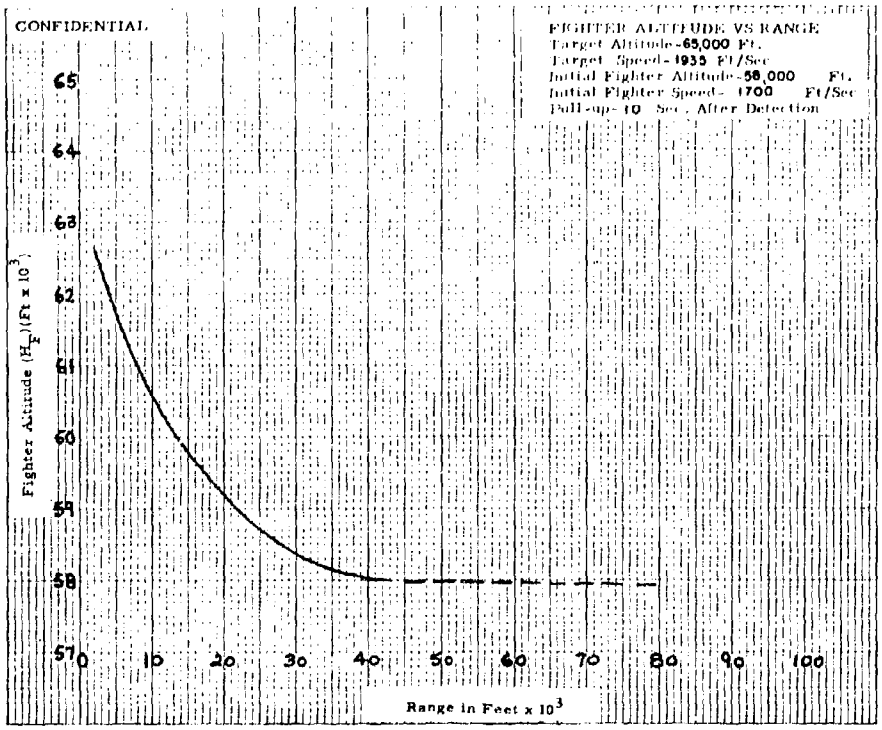

FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed- 1700 Ft/Sec
Pull-up- 5 Sec. After Detection
Fighter Altitude (H_F)(Ft x 10^3)
65
64
63
62
61
60
59
58
57
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 13


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1935 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed- 1700 Ft/Sec
Pull-up- 10 Sec. After Detection
Fighter Altitude (H_F)(Ft x 10^3)
65
64
63
62
61
60
59
58
57
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

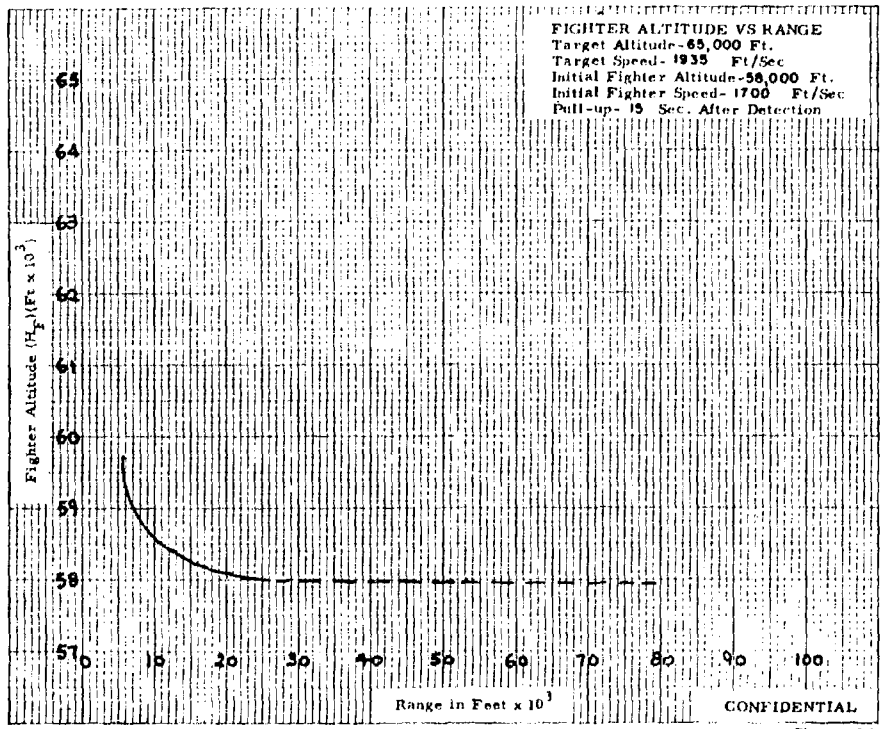
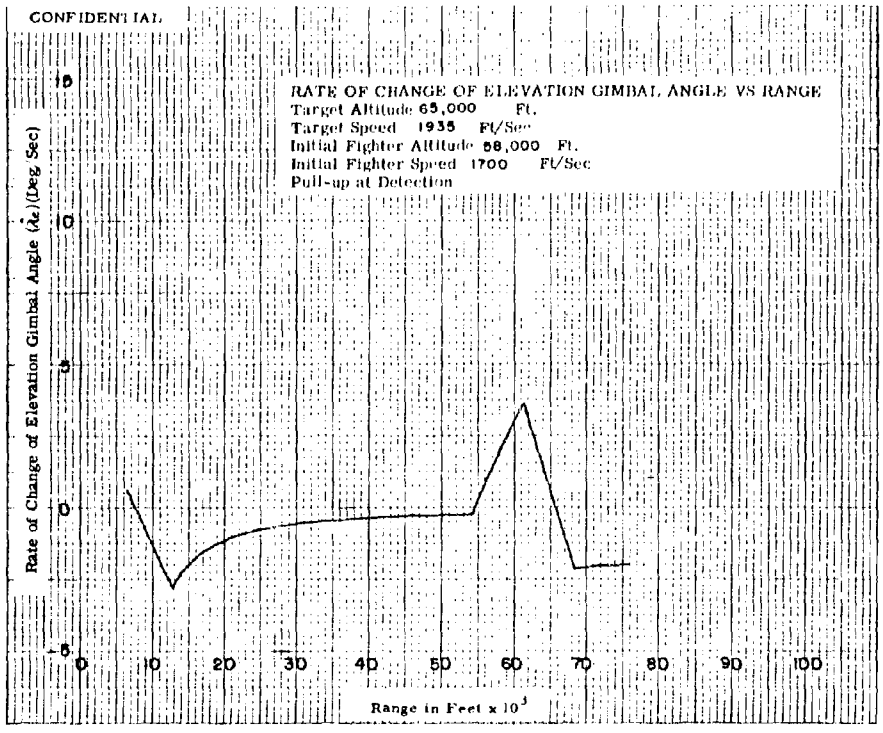

FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed- 1700 Ft/Sec
Pull-up- 15 Sec. After Detection
Fighter Altitude (H_F)(Ft x 10^3)
65
64
63
62
61
60
59
58
57
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 14


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle (λ̇ε) (Deg/Sec)
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

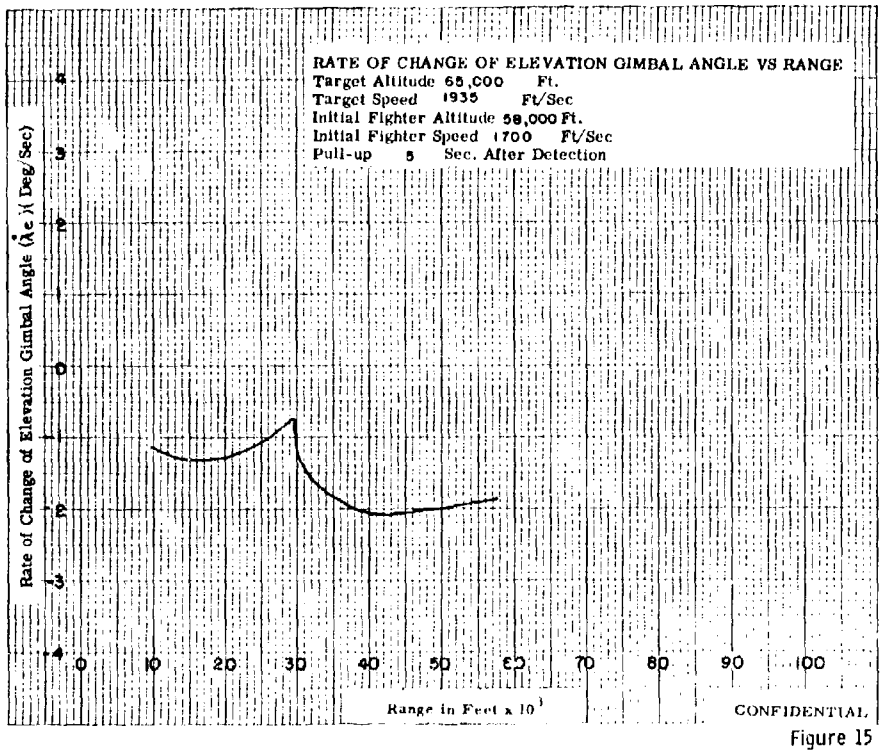
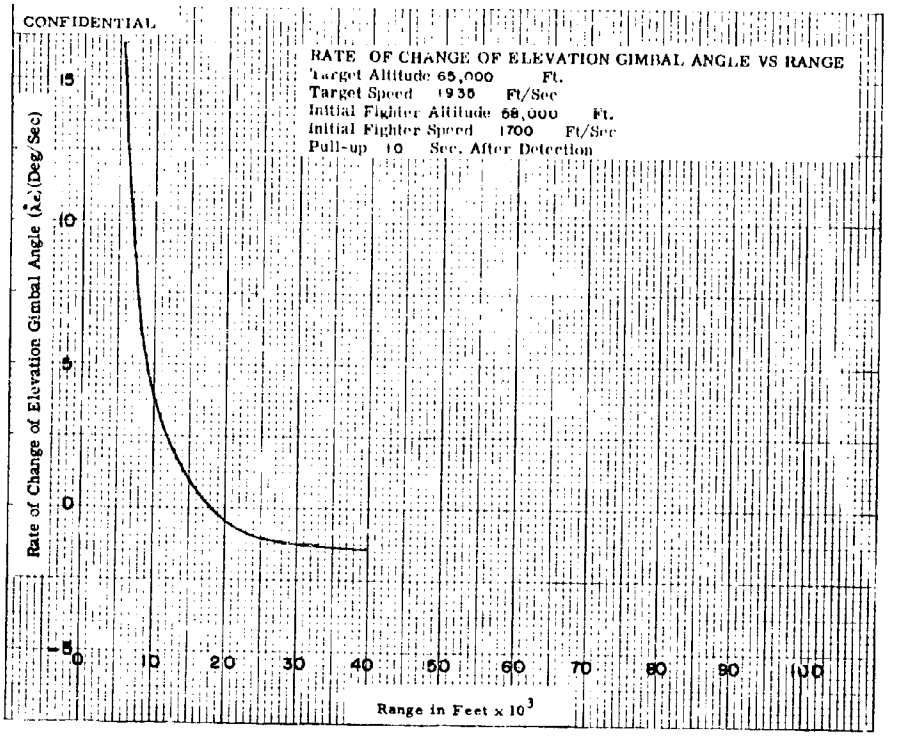

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λ̇ε) (Deg/Sec)
4
3
2
1
0
-1
-2
-3
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 15


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (ε̇e)(Deg/Sec)
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

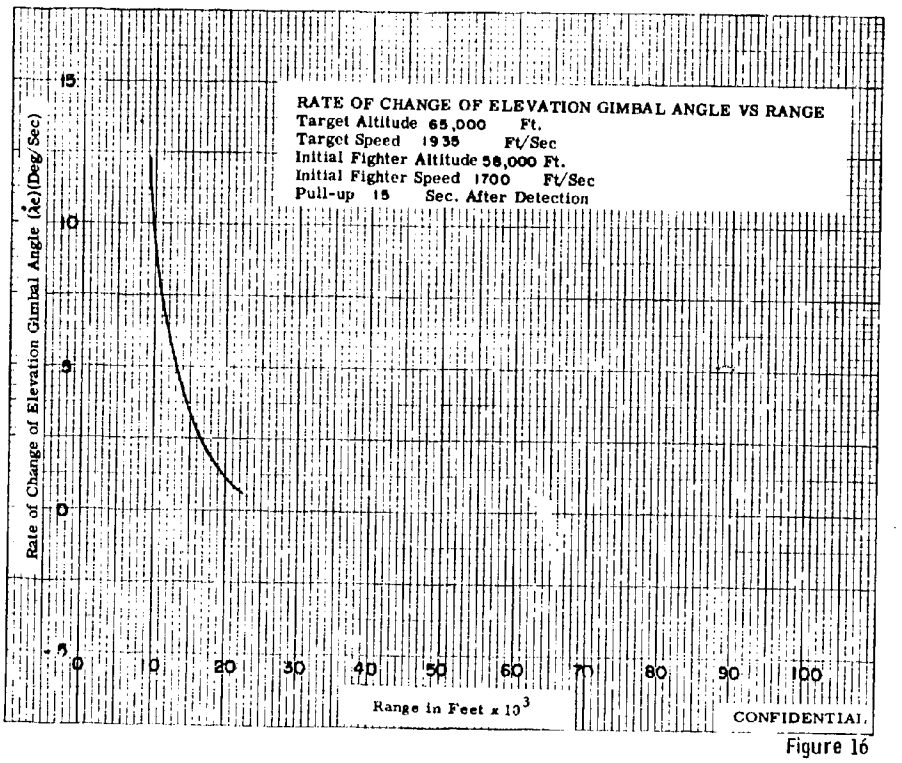
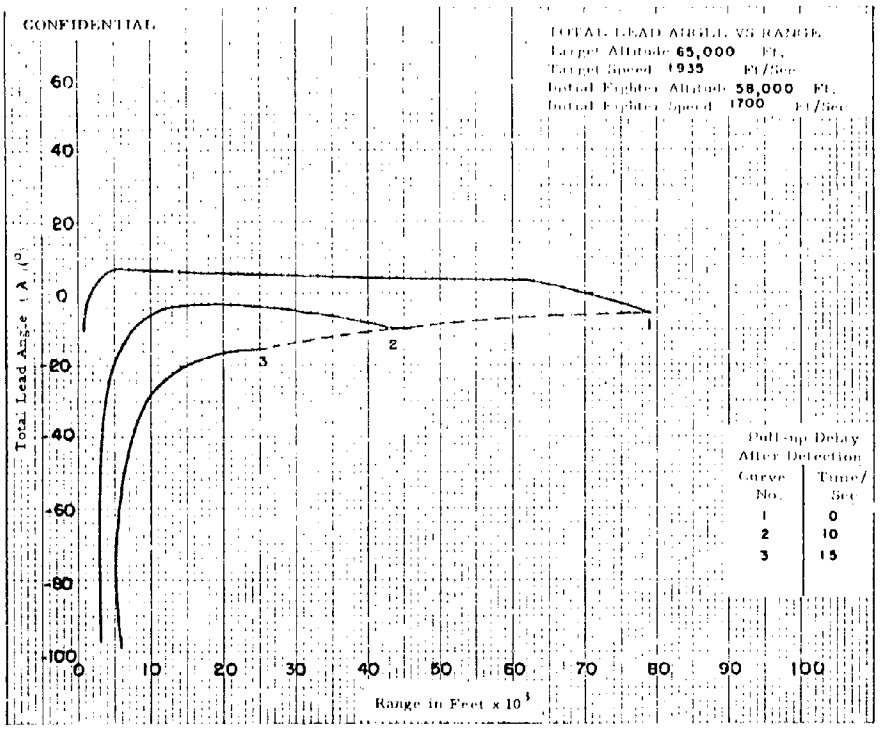

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (ε̇e)(Deg/Sec)
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 16


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
3 | 15
Total Lead Angle (λ)(°)
Range in Feet x 10³

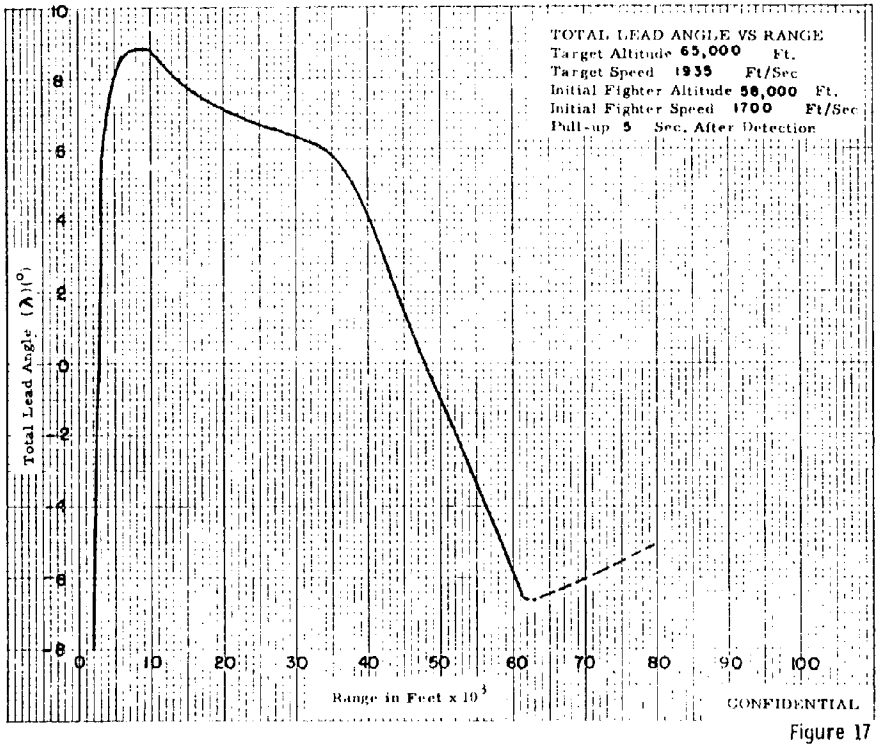
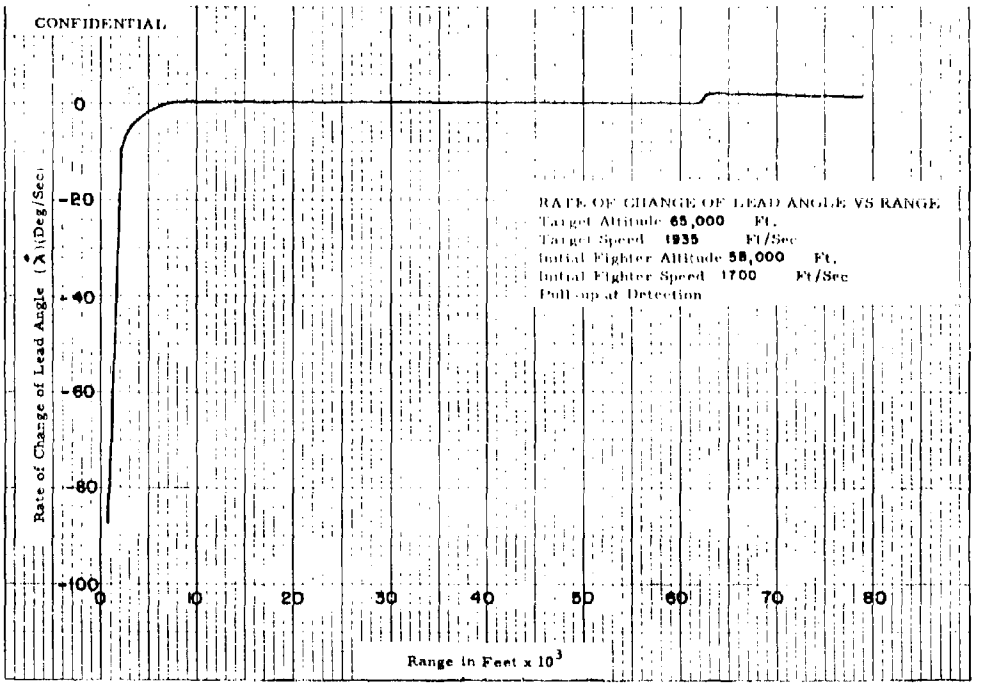

TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 5 Sec. After Detection
Total Lead Angle (λ)(°)
Range in Feet x 10³
CONFIDENTIAL

Figure 17


CONFIDENTIAL
Rate of Change of Lead Angle $(\dot{\lambda})$(Deg/Sec)
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up at Detection

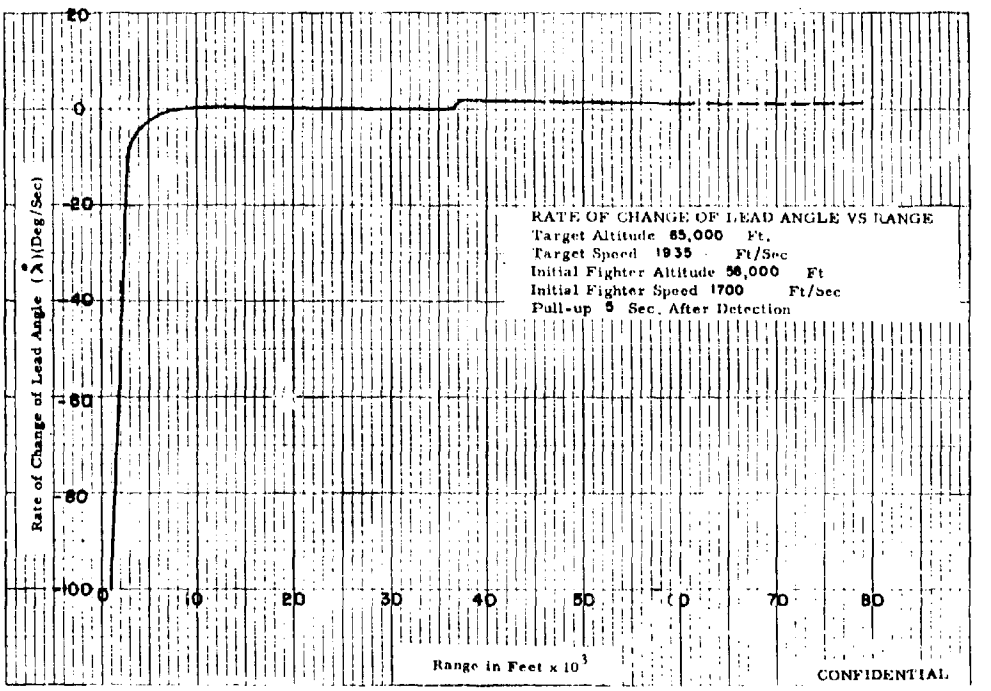
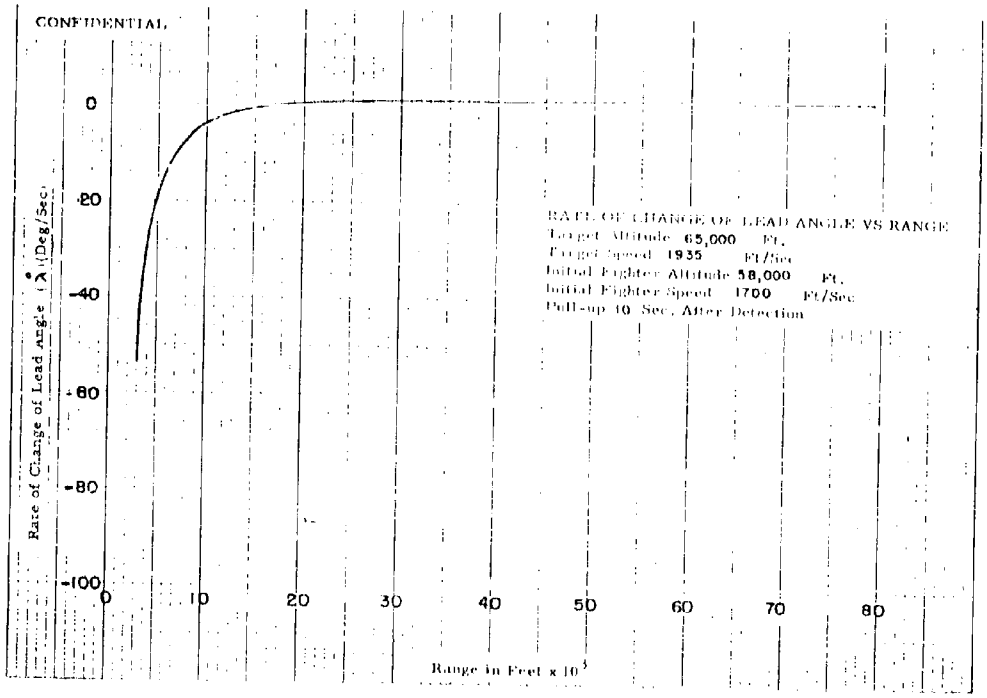

Rate of Change of Lead Angle $(\dot{\lambda})$(Deg/Sec)
20
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1700 Ft/Sec
Pull-up 5 Sec. After Detection
CONFIDENTIAL

Figure 18


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

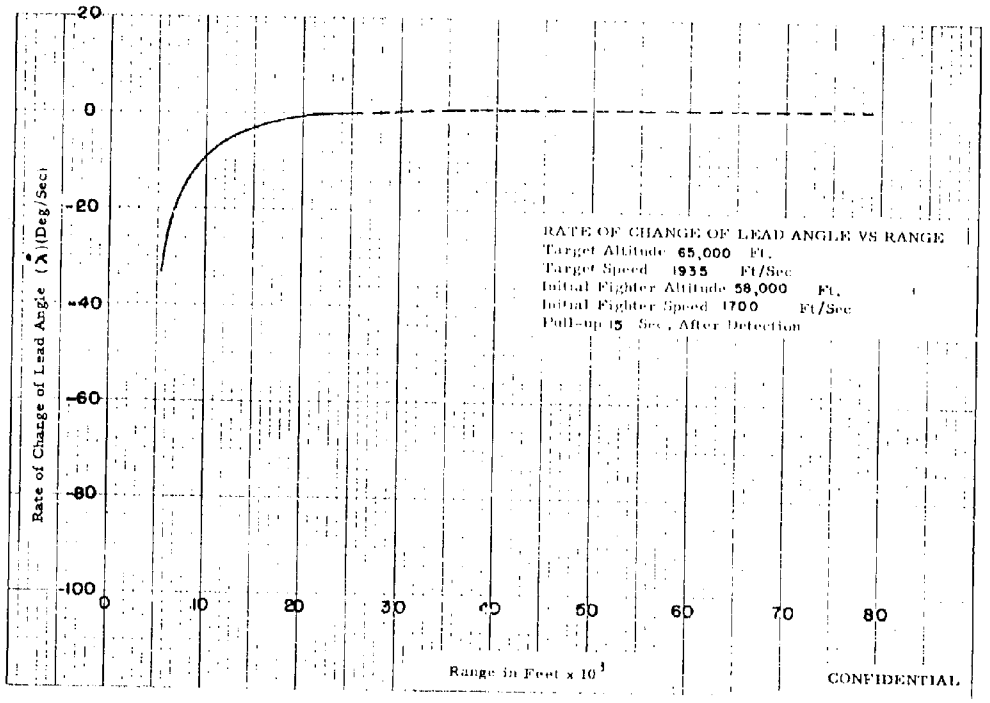
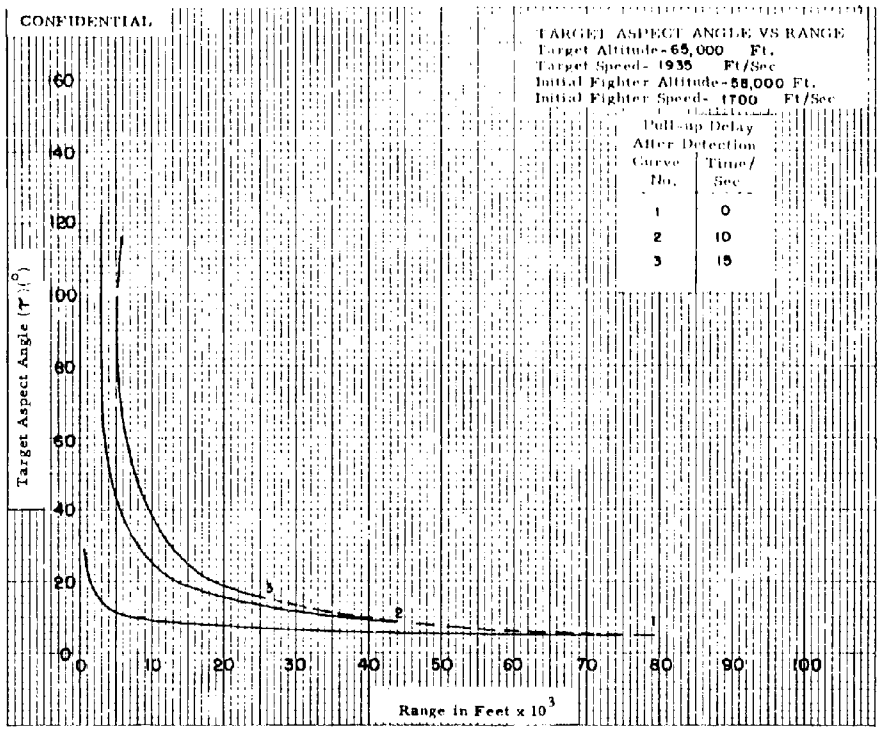

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
20
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

Figure 19


CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude- 58,000 Ft.
Initial Fighter Speed- 1700 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 15
Target Aspect Angle (T)(°)
Range in Feet x 10^3

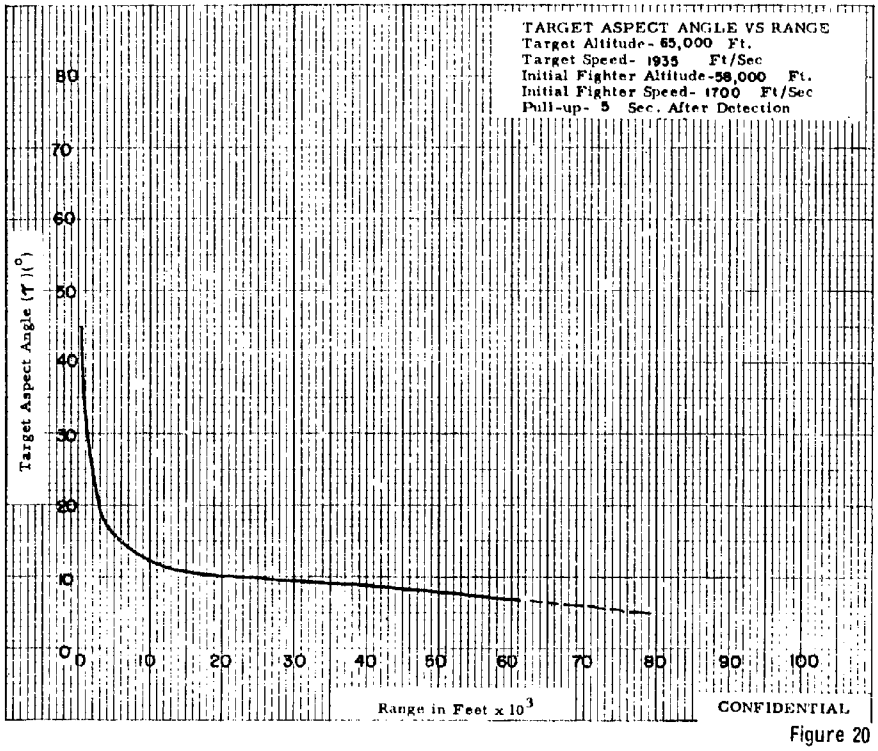
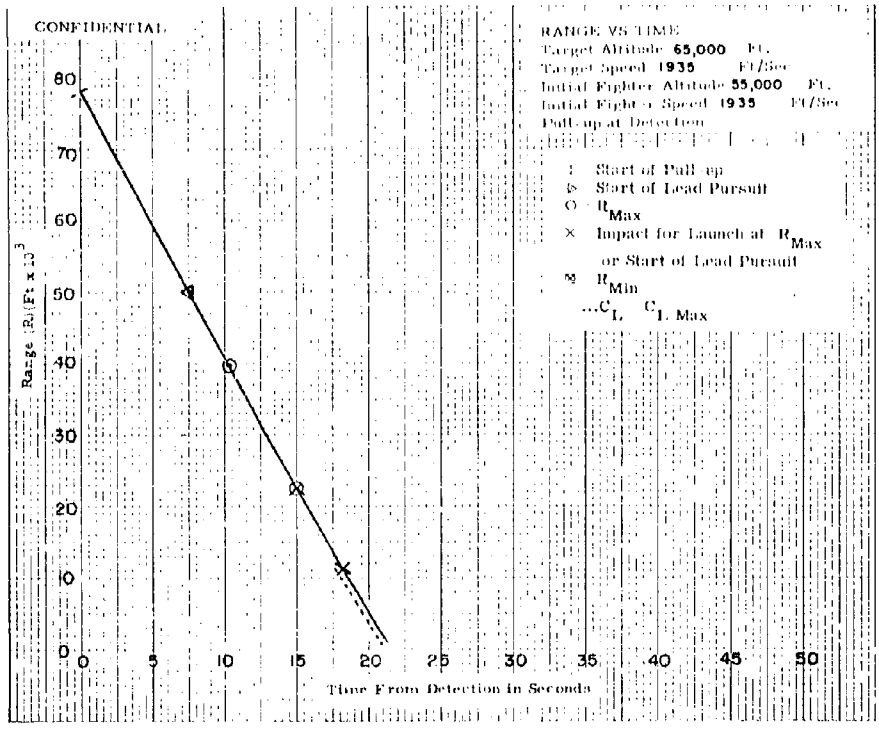

TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude- 58,000 Ft.
Initial Fighter Speed- 1700 Ft/Sec
Pull-up- 5 Sec. After Detection
Target Aspect Angle (T)(°)
Range in Feet x 10^3
CONFIDENTIAL

Figure 20


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Start of Pull-up
Start of Lead Pursuit
R_{Max}
Impact for Launch at R_{Max} or Start of Lead Pursuit
R_{Min}
C_L $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

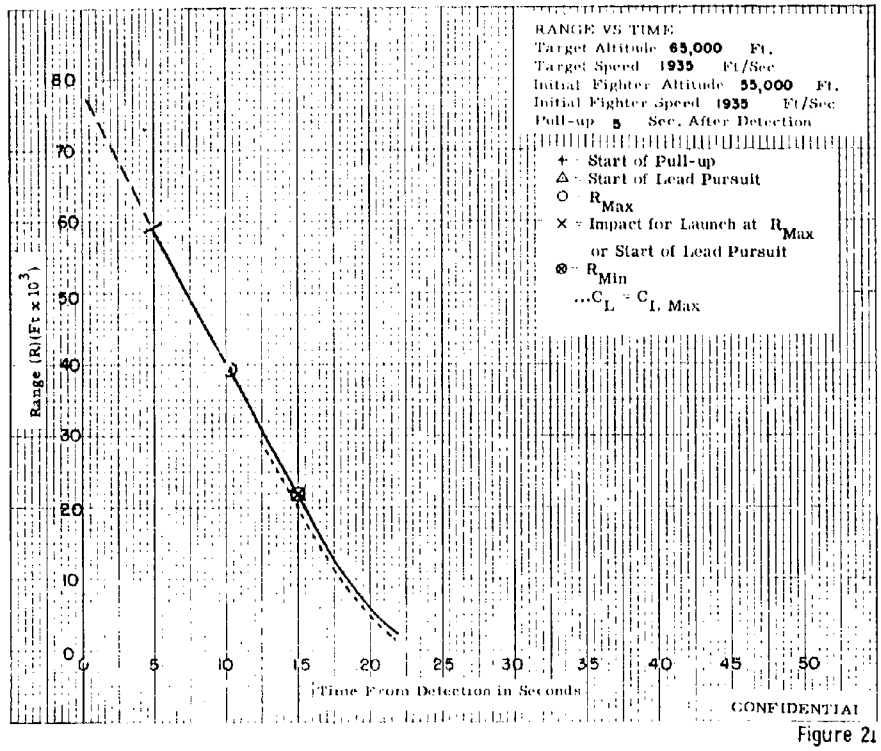
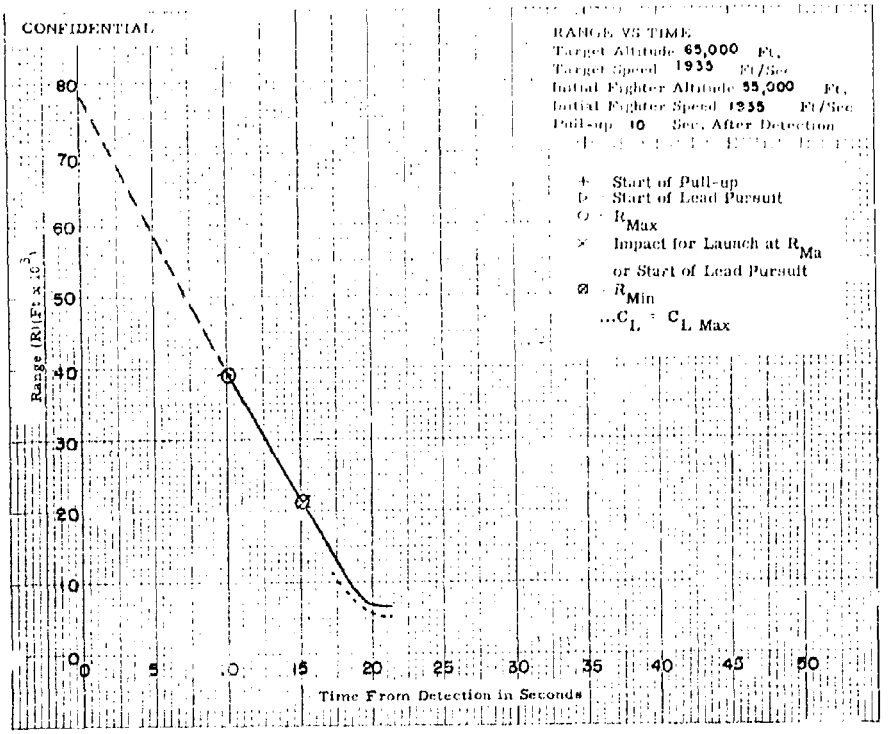

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Start of Pull-up
Start of Lead Pursuit
R_{Max}
Impact for Launch at R_{Max} or Start of Lead Pursuit
R_{Min}
C_L $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 21


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
+ Start of Pull-up
▷ Start of Lead Pursuit
○ R_{Max}
× Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

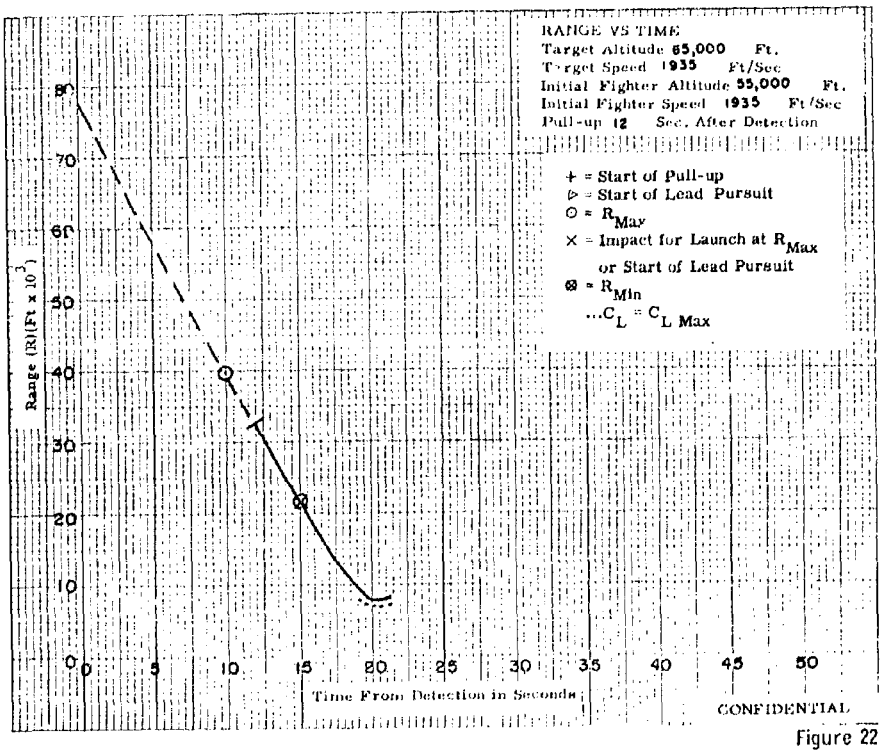
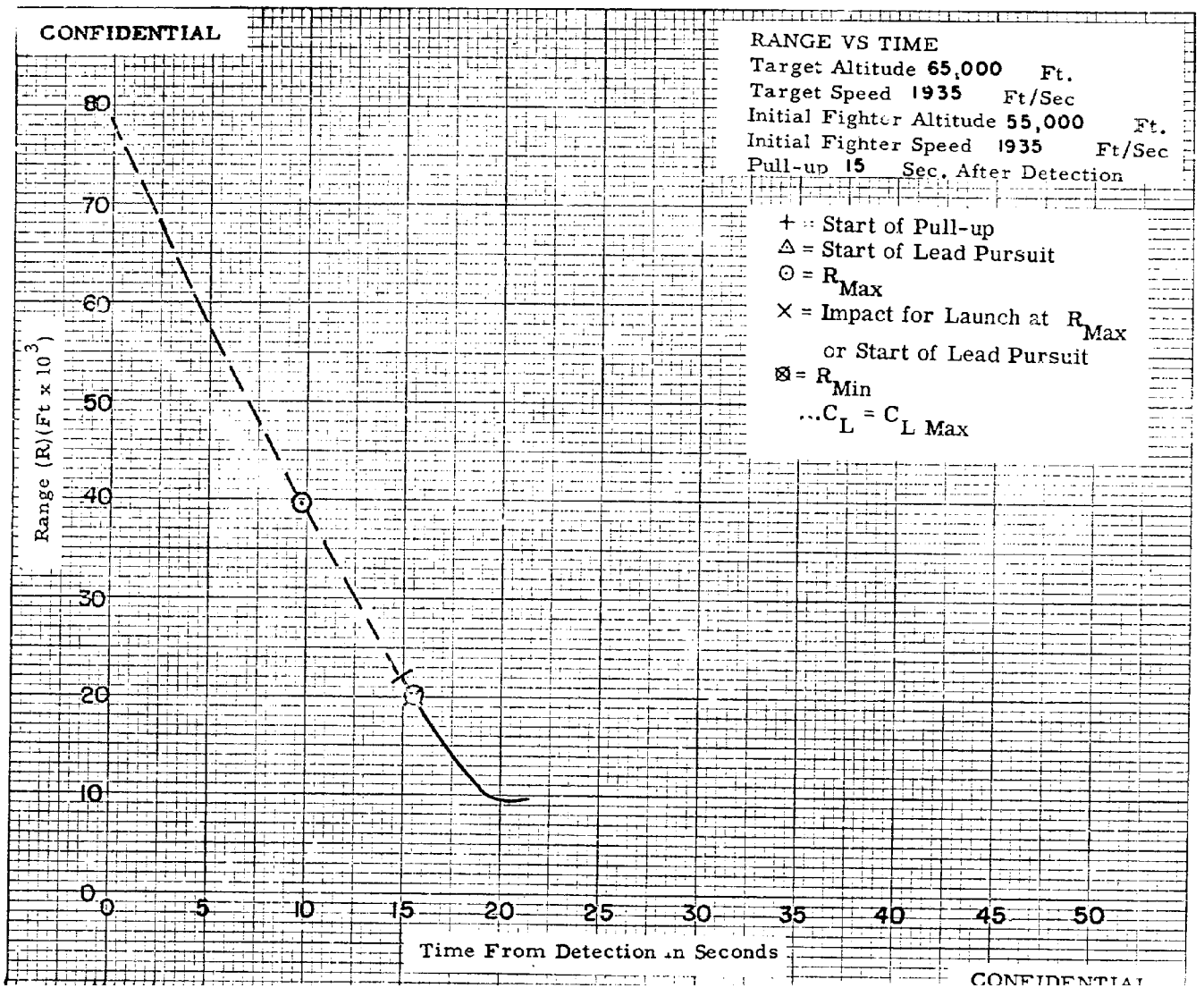
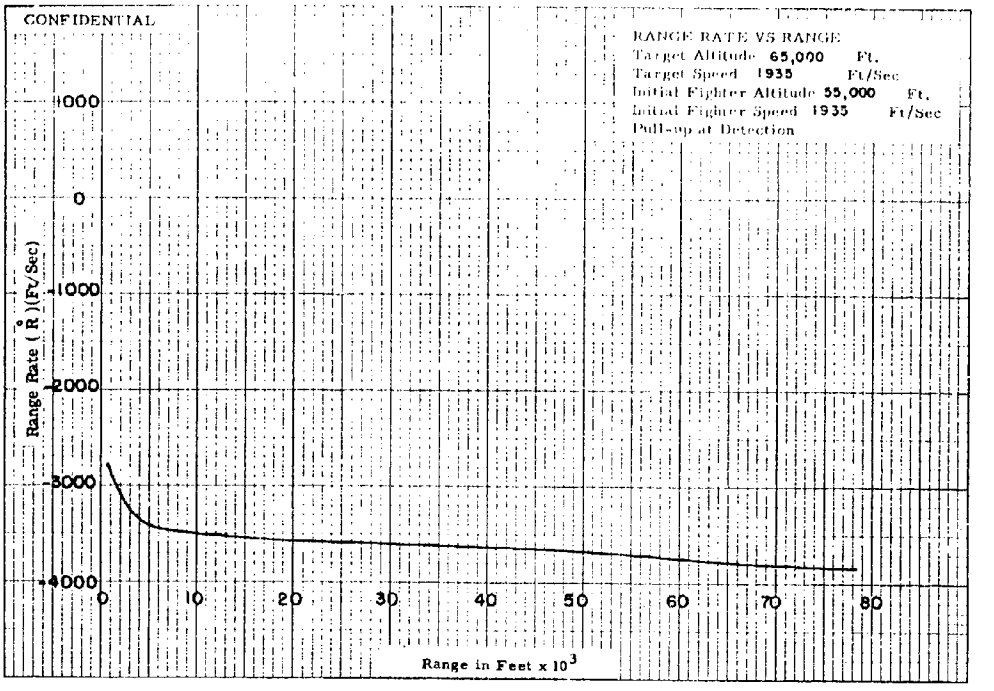

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 22


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊠ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
CONFIDENTIAL


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

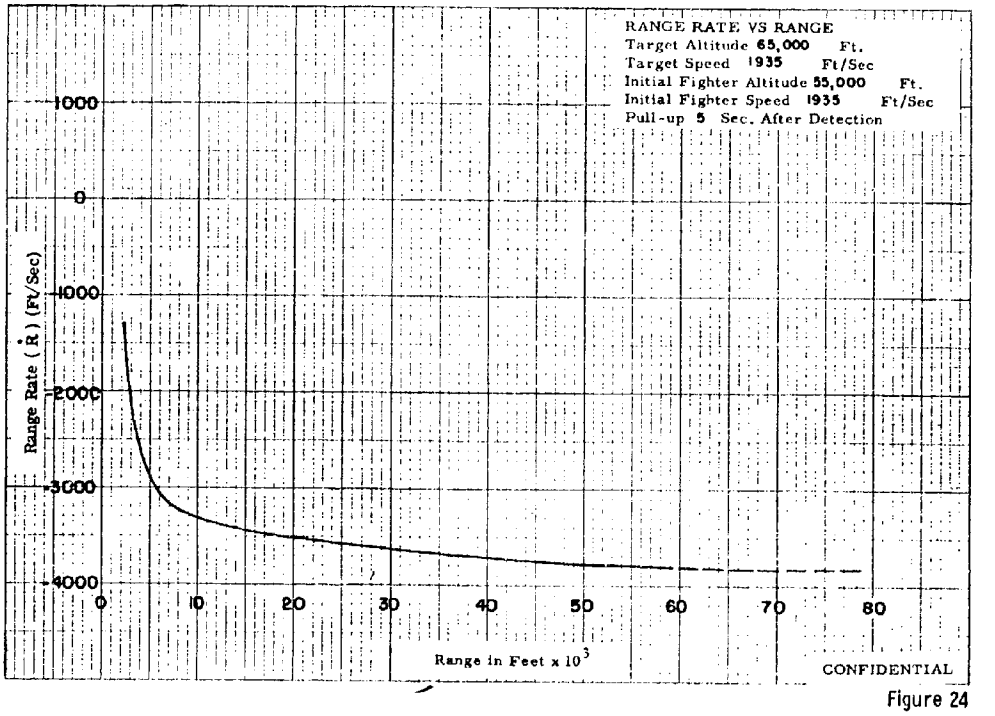
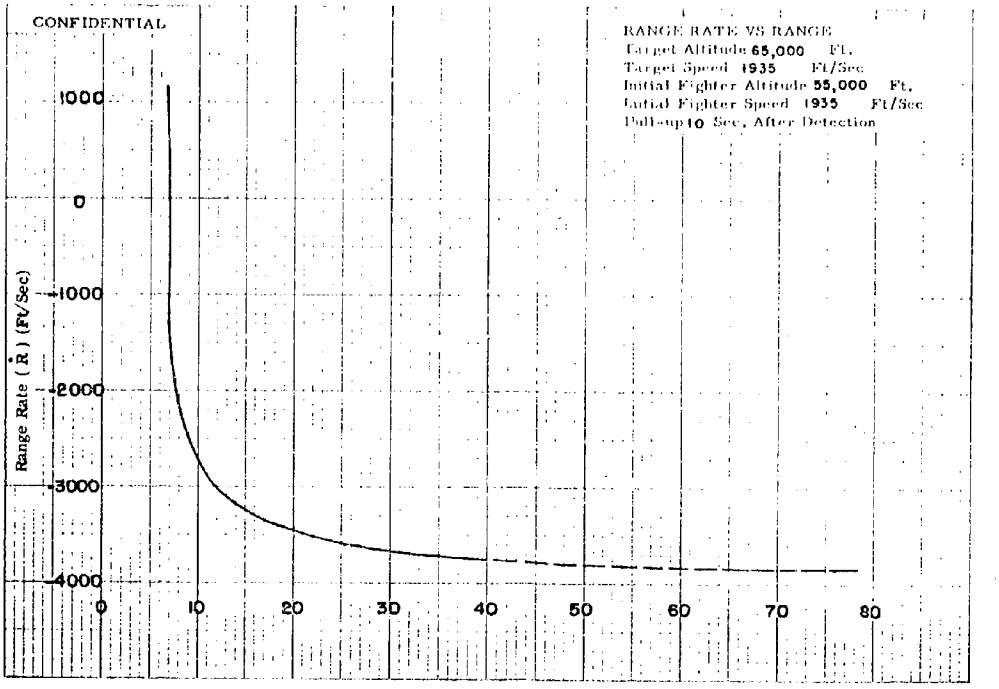

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 24


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80

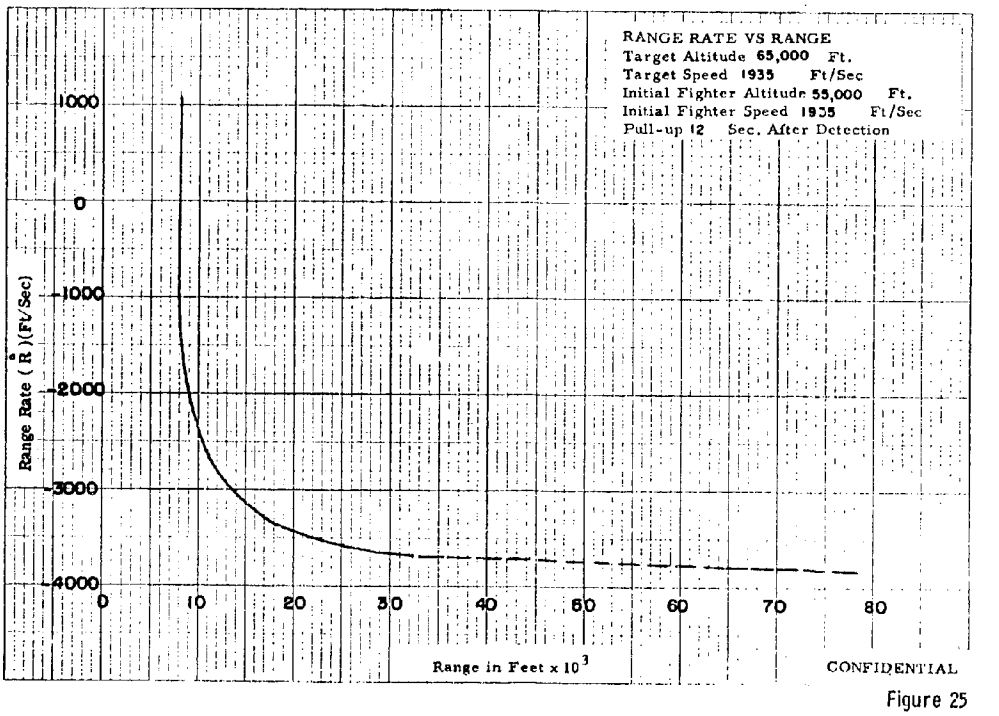

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 25

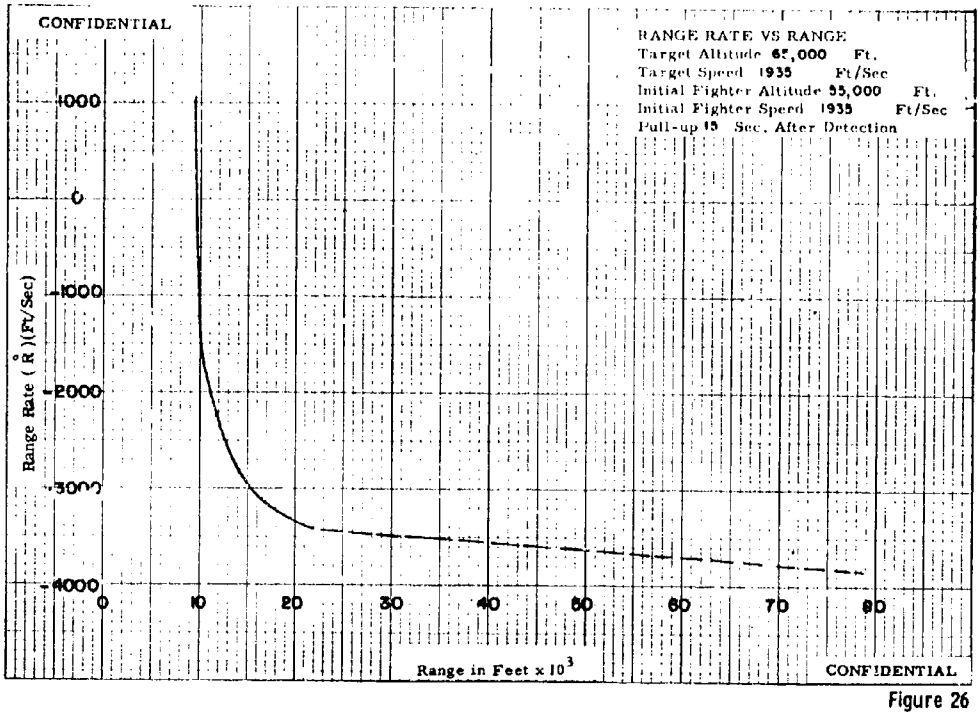


Figure 26

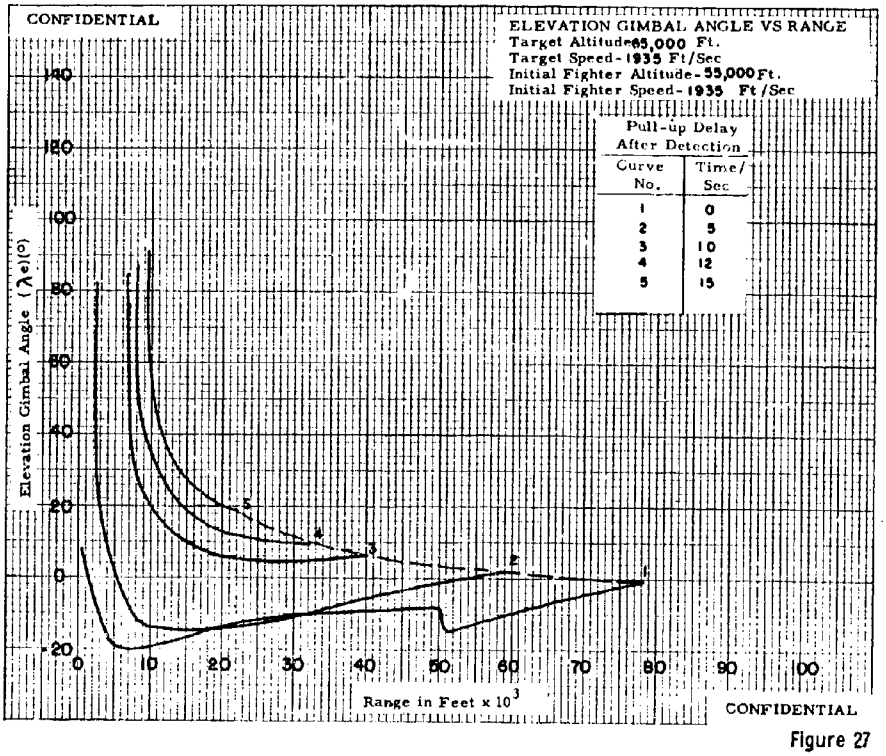
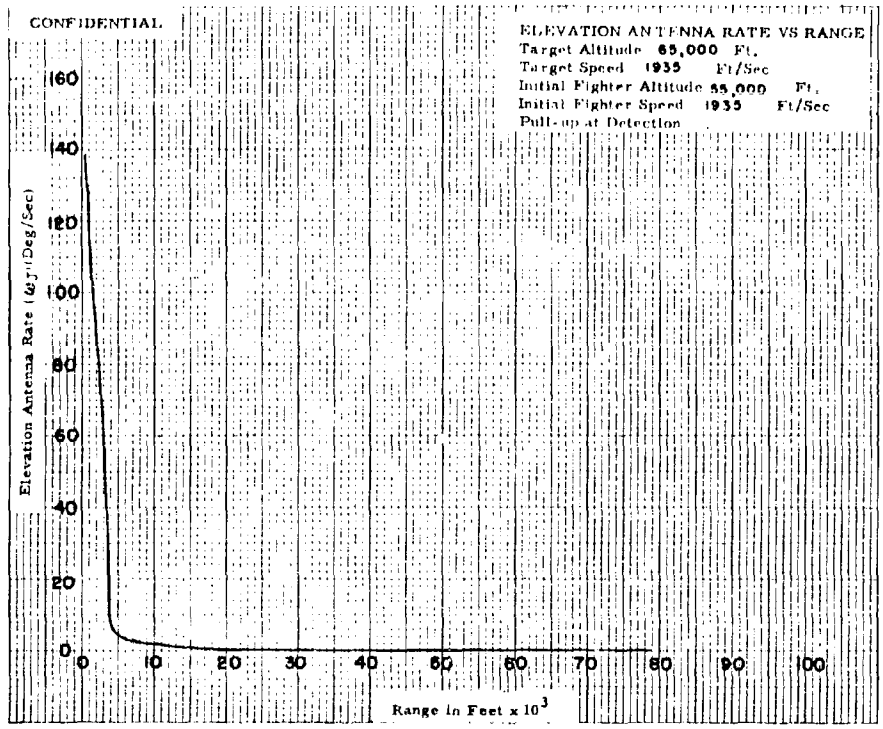


Figure 27


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 65,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Elevation Antenna Rate (ω_E) (Deg/Sec)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

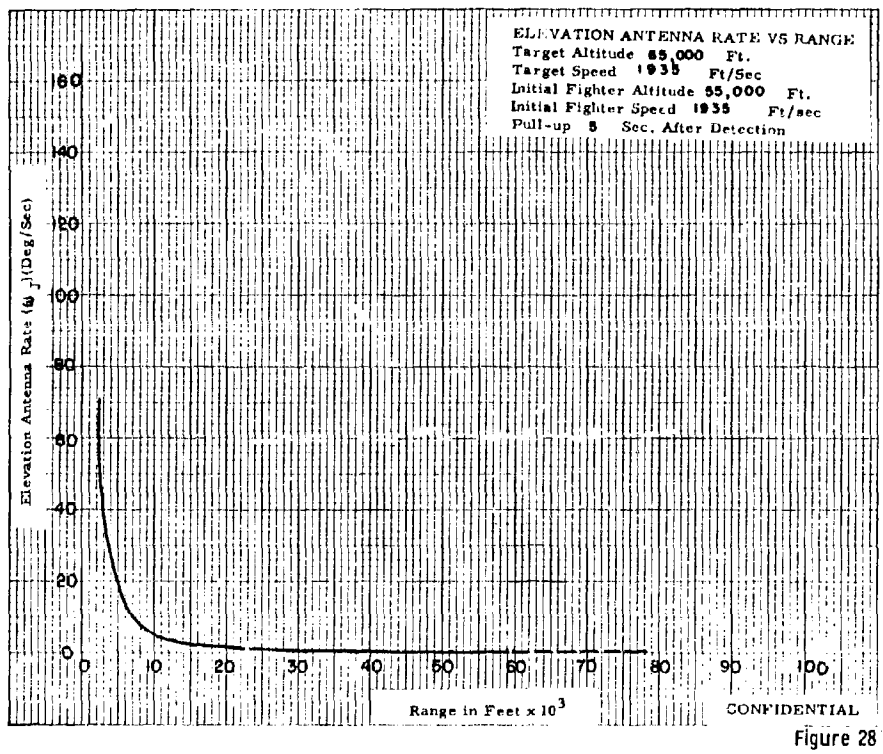
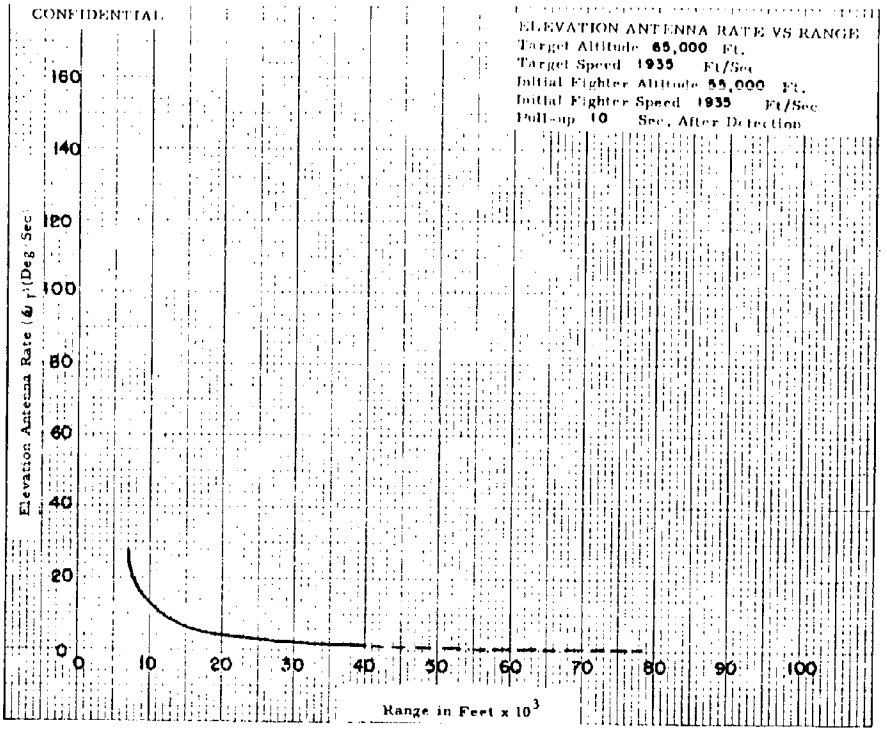

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 65,000 Ft.
Initial Fighter Speed 1935 Ft/sec
Pull-up 5 Sec. After Detection
Elevation Antenna Rate (ω_E) (Deg/Sec)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 28


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Elevation Antenna Rate (ω r)(Deg/Sec)
Range in Feet x 10³

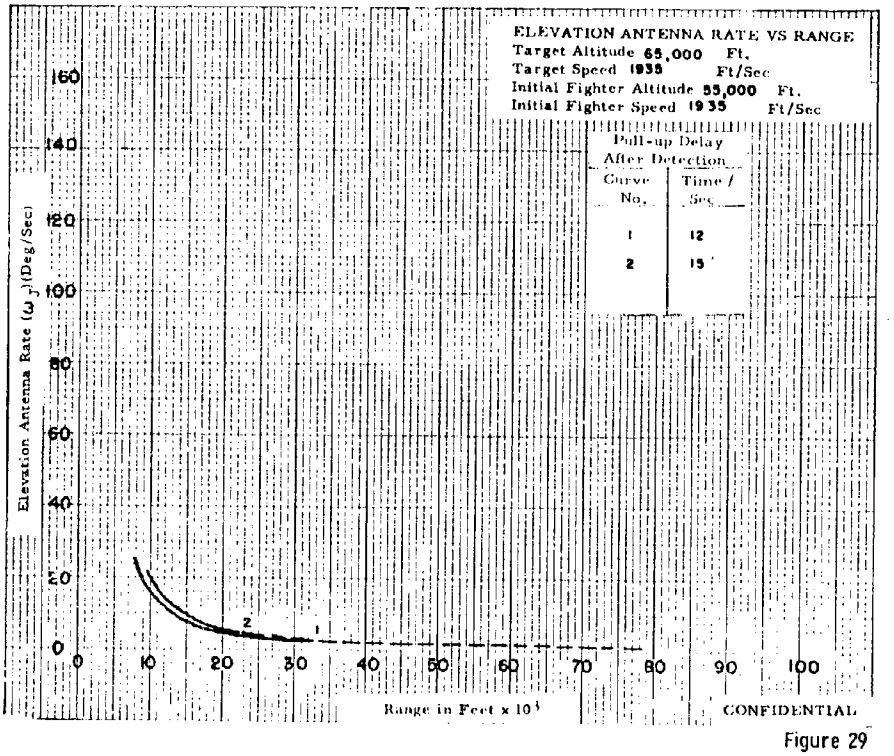

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time / Sec
1 | 12
2 | 15
Elevation Antenna Rate (ω r)(Deg/Sec)
Range in Feet x 10³
CONFIDENTIAL

Figure 29

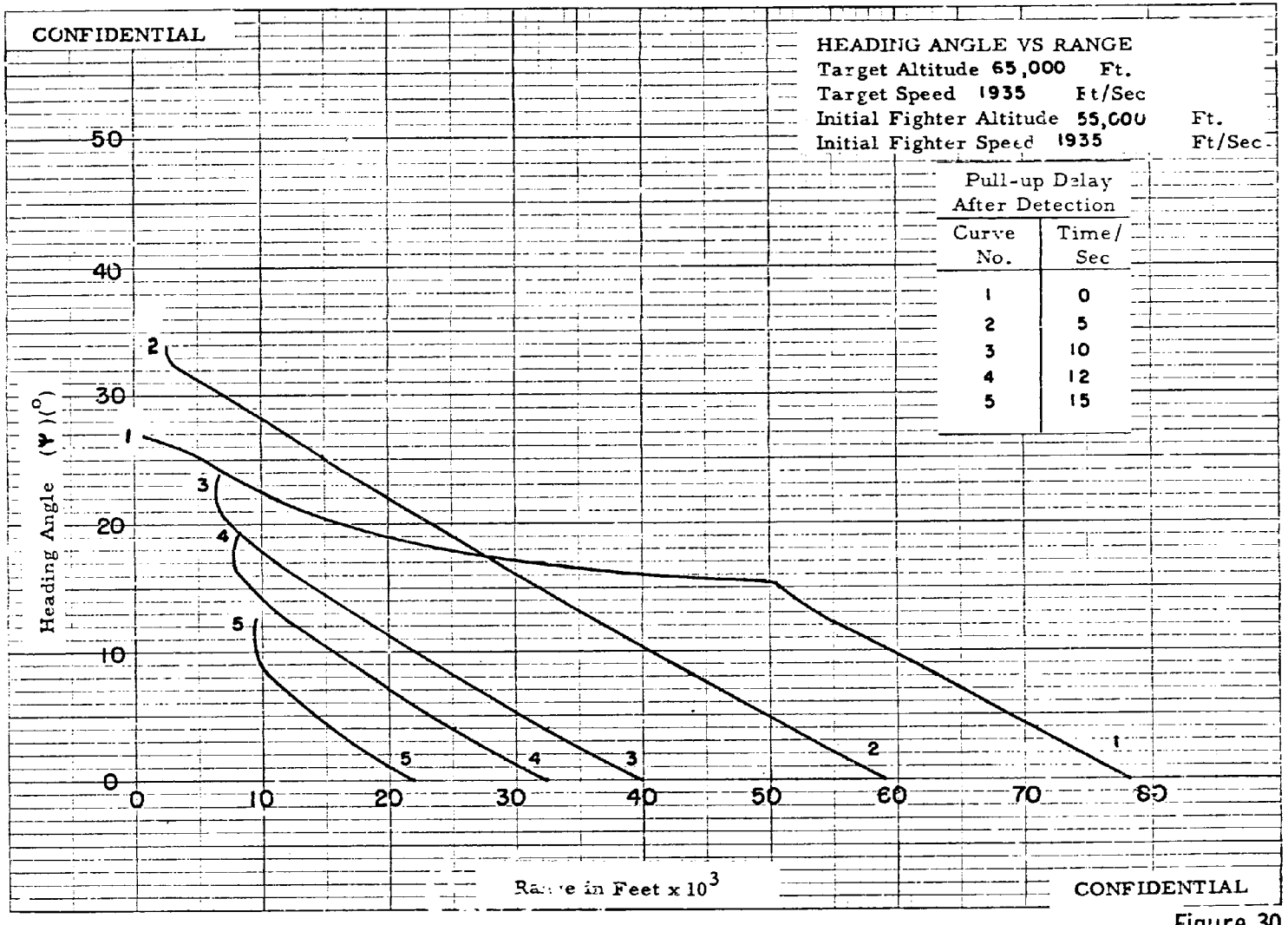
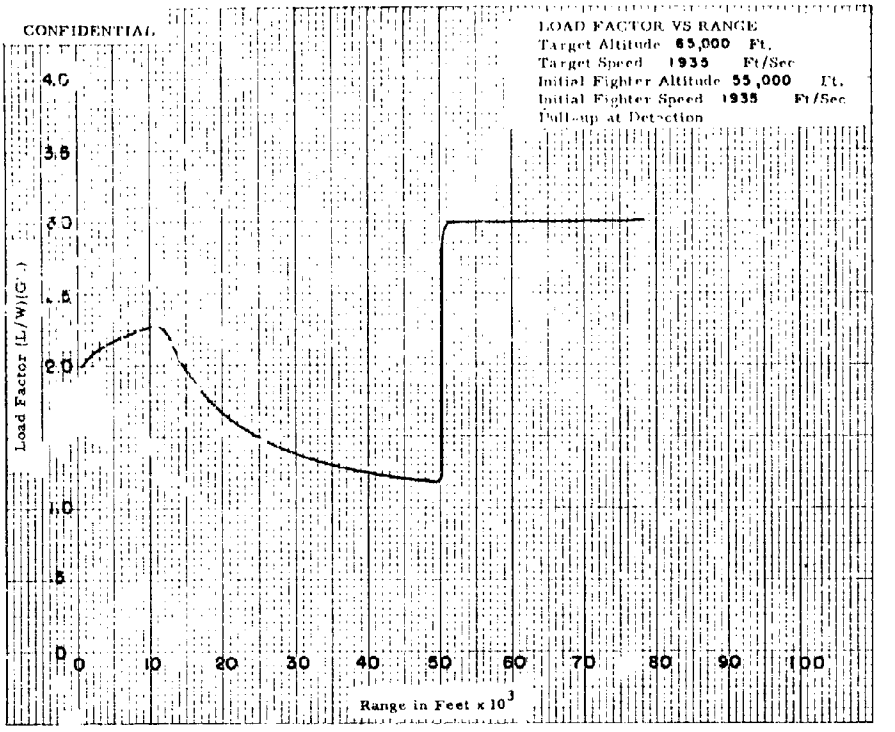

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 5
3 | 10
4 | 12
5 | 15
Heading Angle (ψ)(°)
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 30


LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

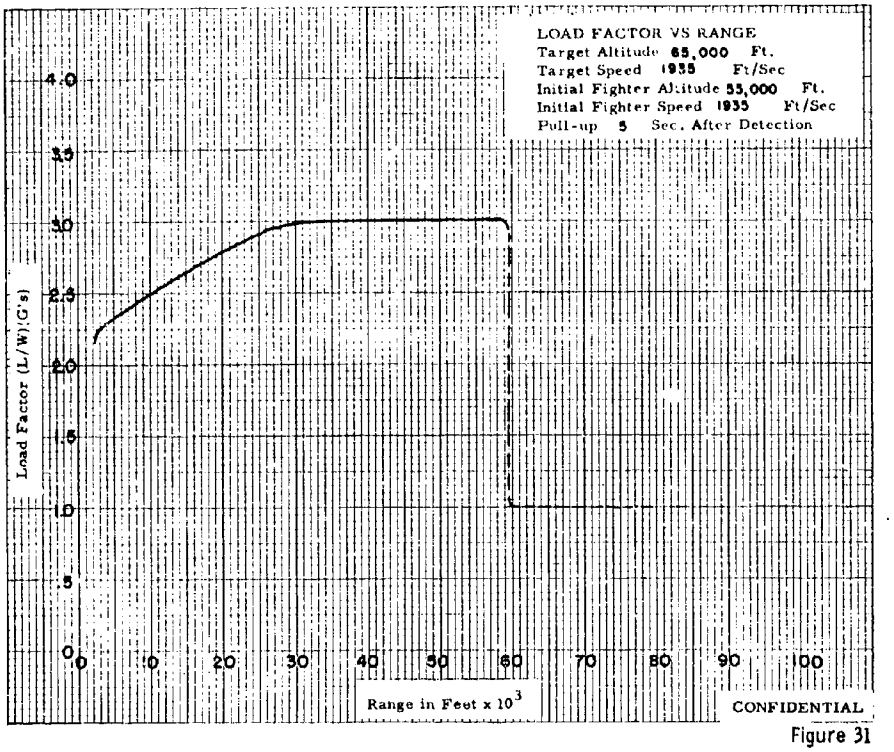
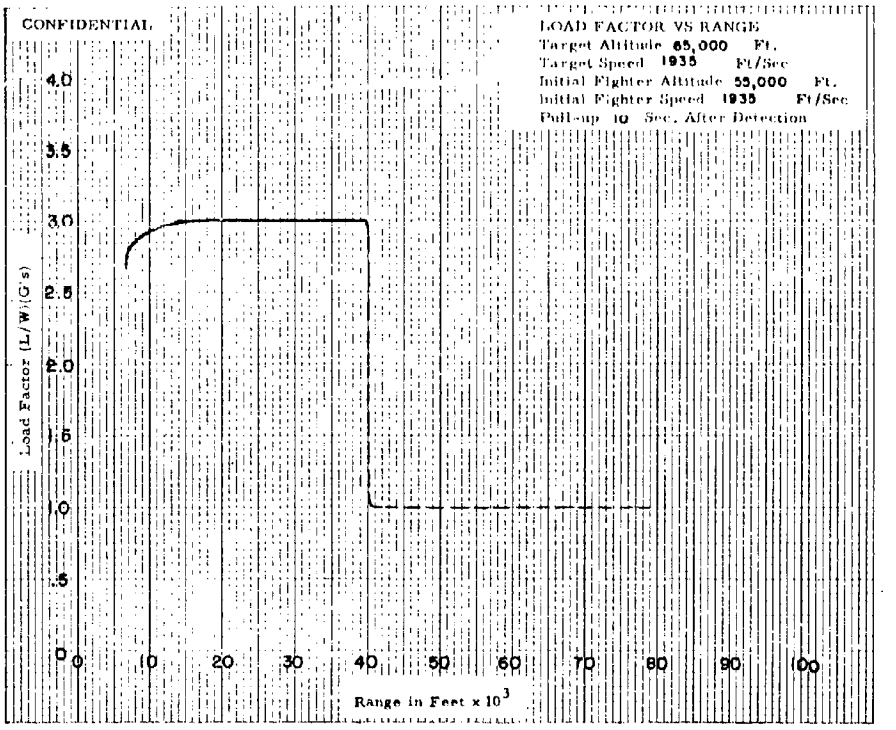

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

Figure 31


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

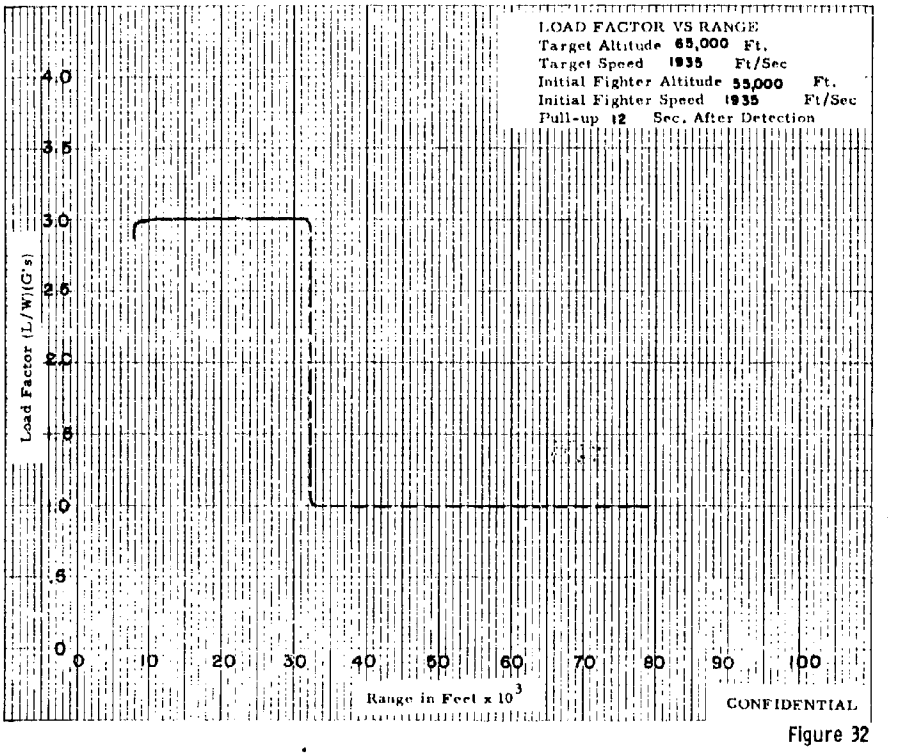

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 32

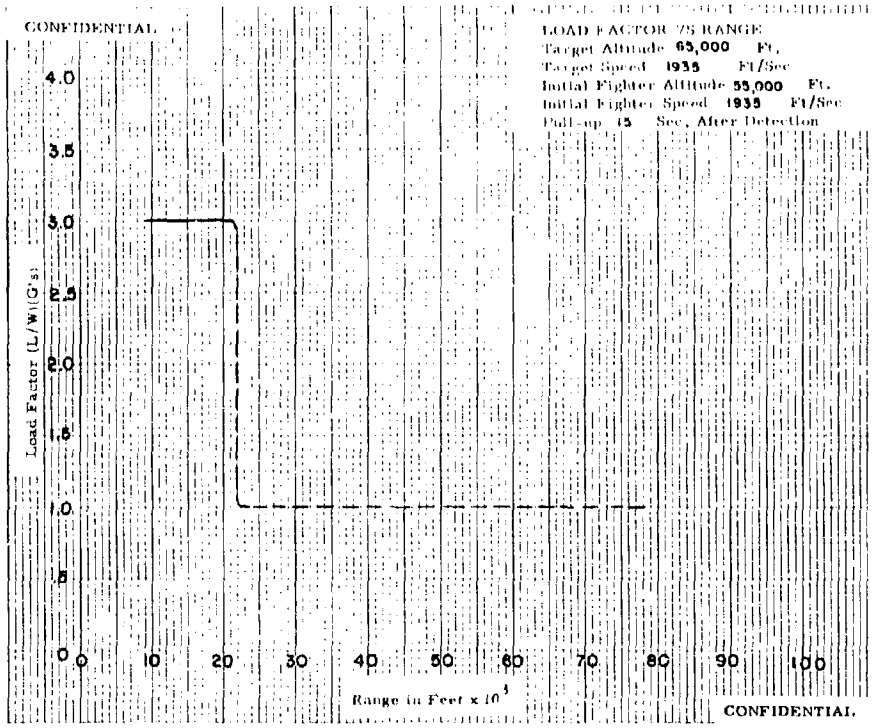


Figure 33

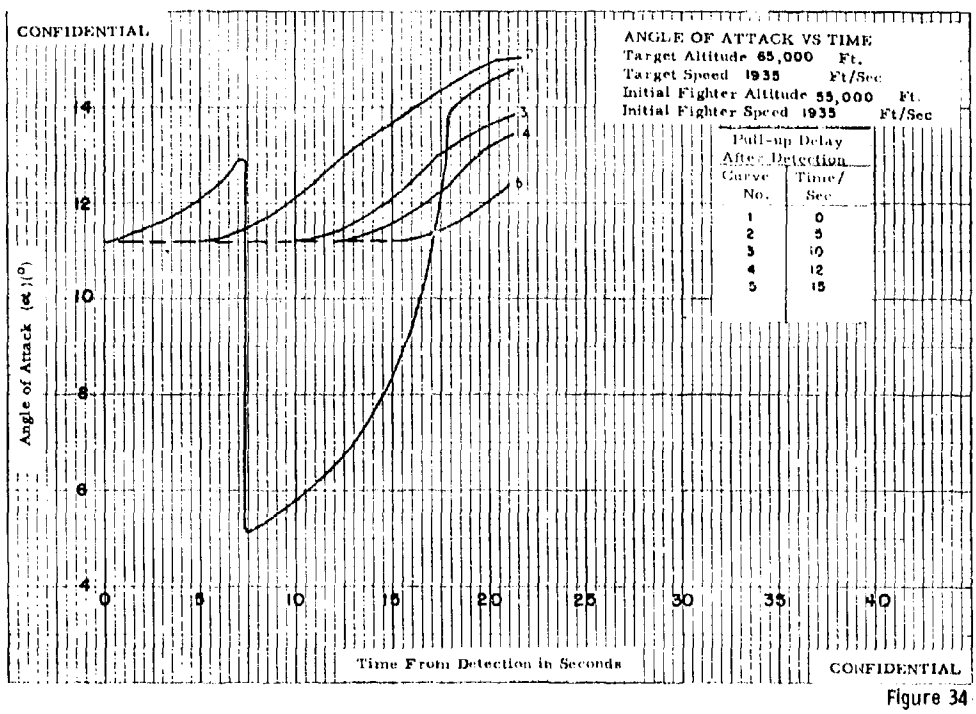


Figure 34

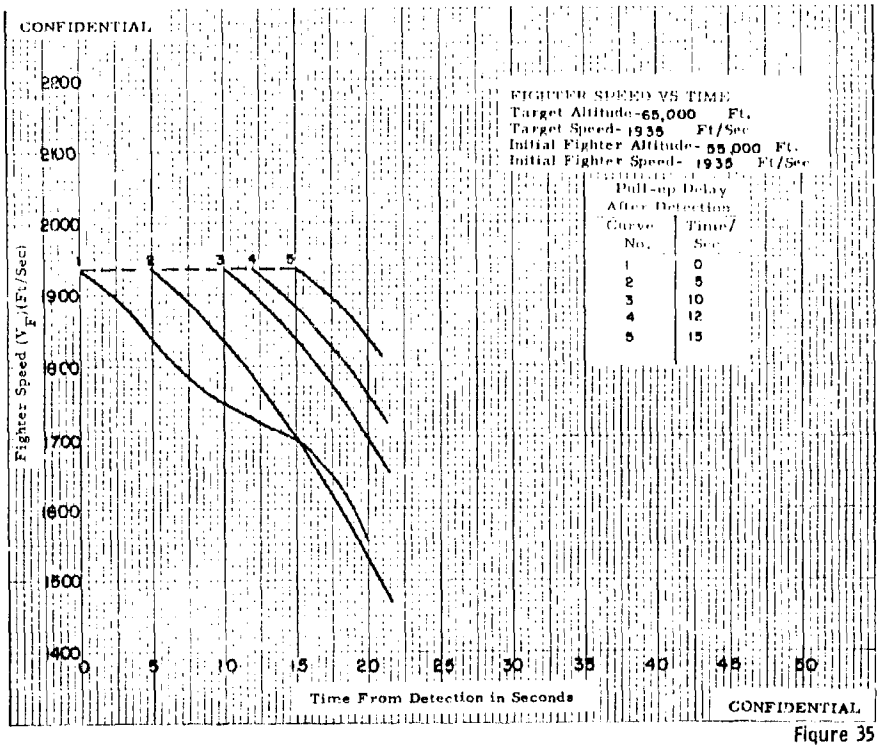


Figure 35

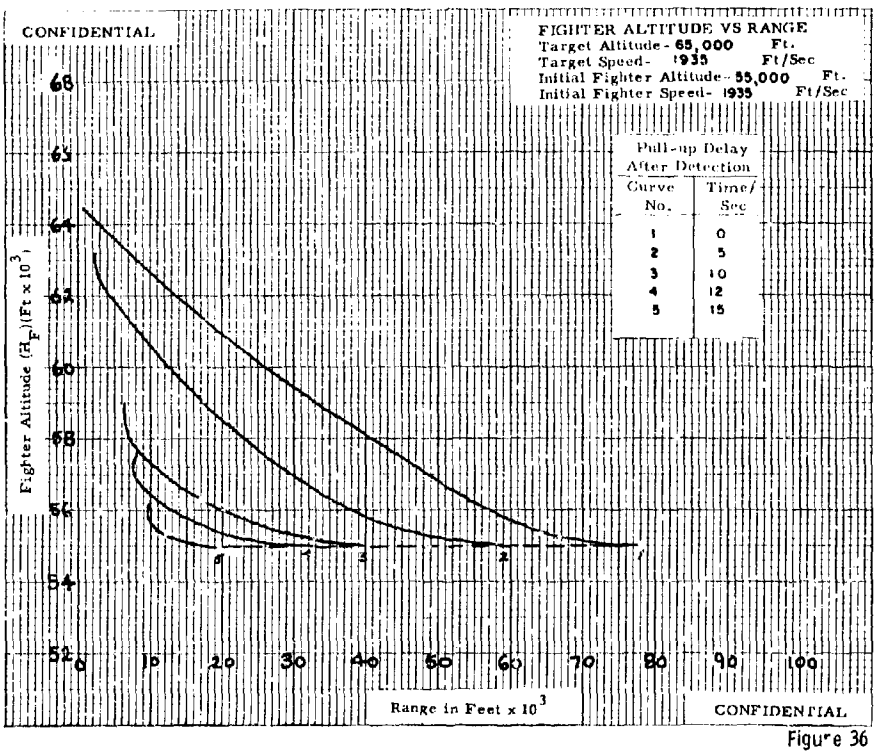
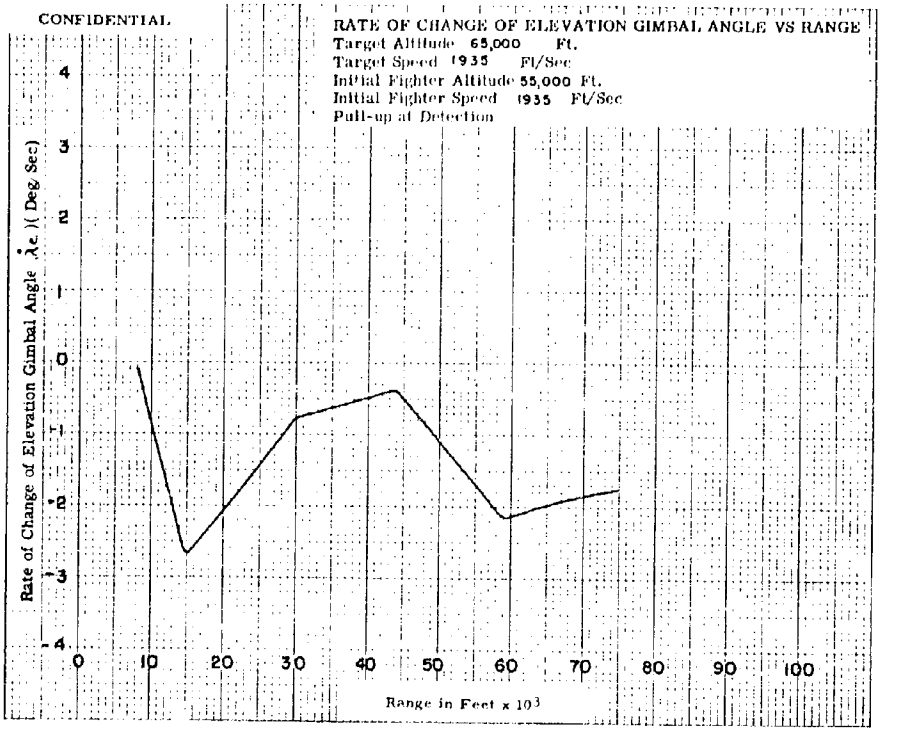


Figure 36


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle $\dot{\lambda}_e$)(Deg/Sec)
4
3
2
1
0
-1
-2
-3
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

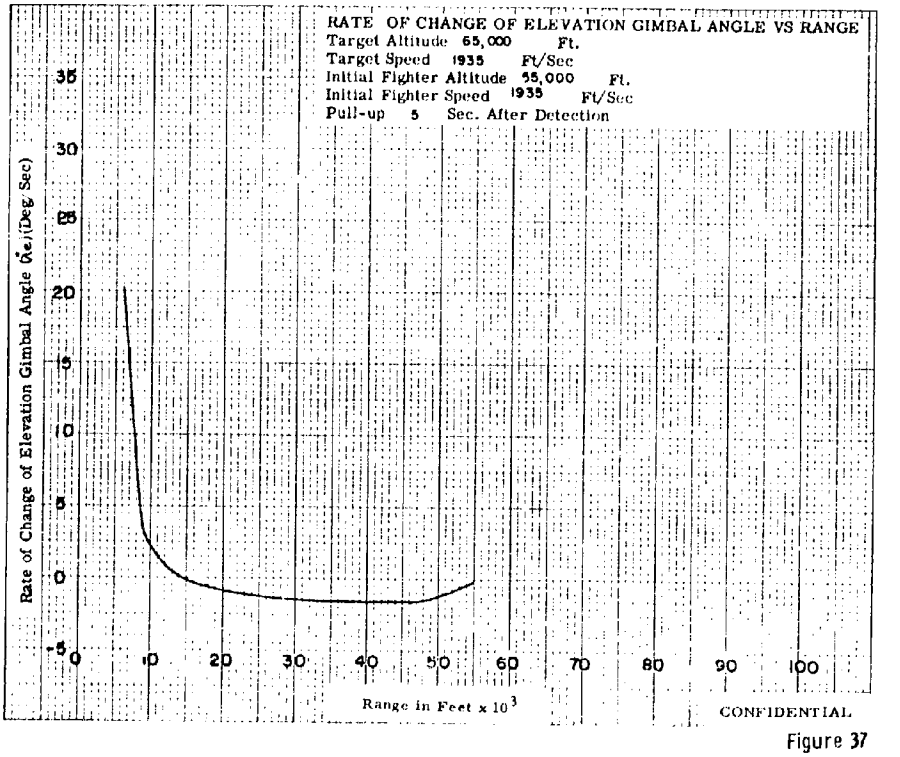
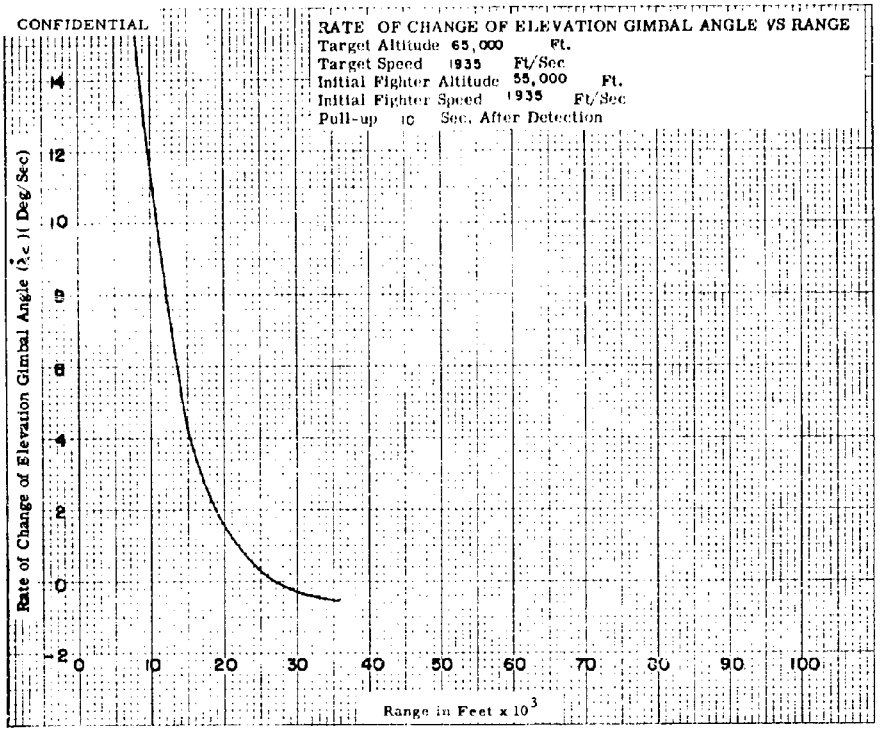

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Elevation Gimbal Angle $\dot{\sigma}_e$)(Deg/Sec)
35
30
25
20
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 37


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λ̇e) (Deg/Sec)
Range in Feet x 10³

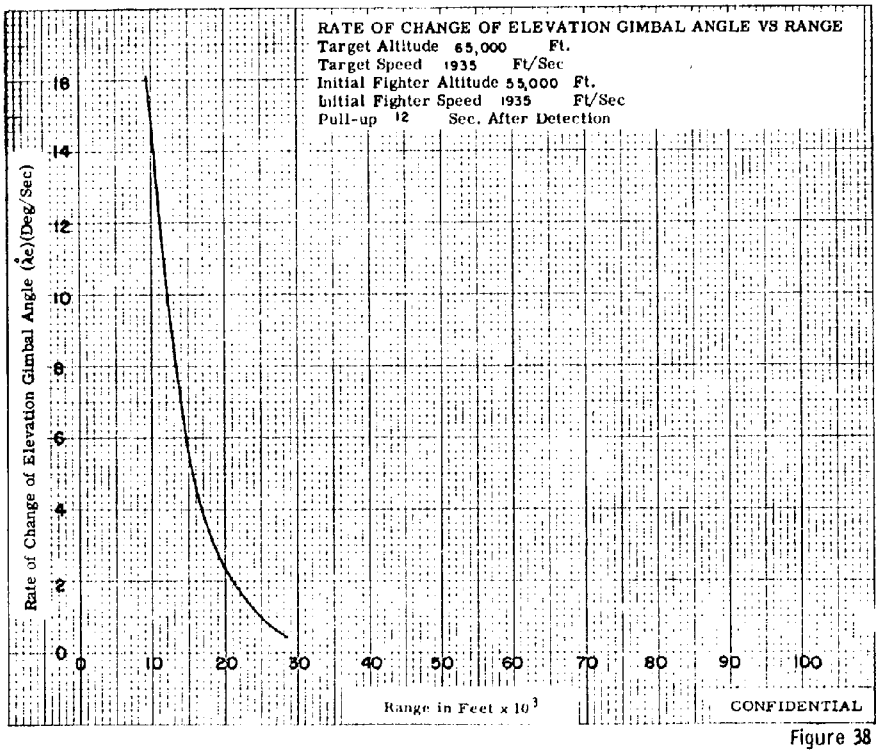

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
Range in Feet x 10³

Figure 38

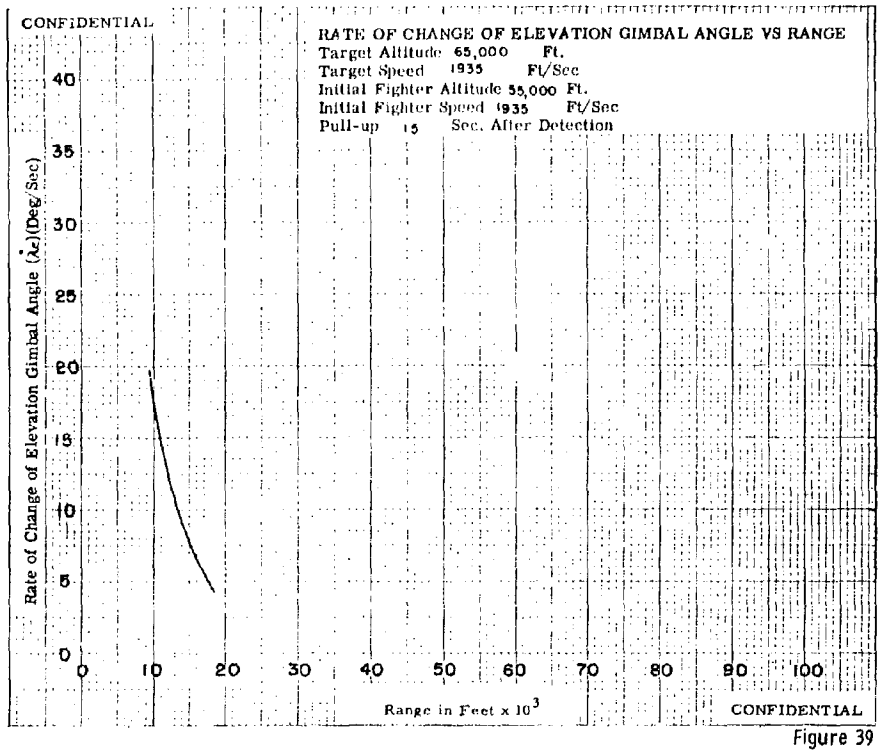


Figure 39

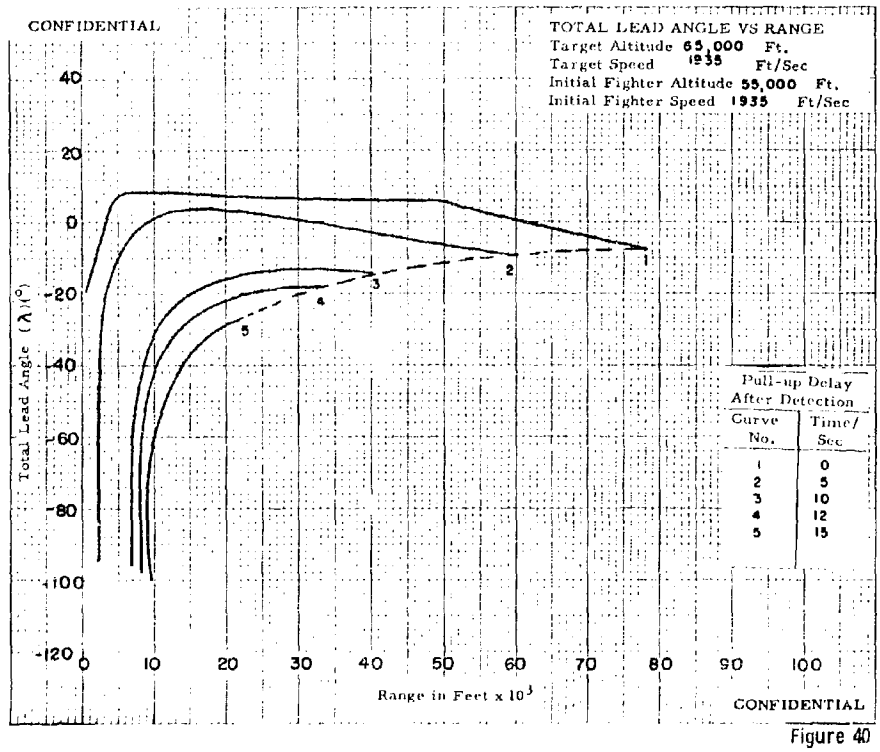
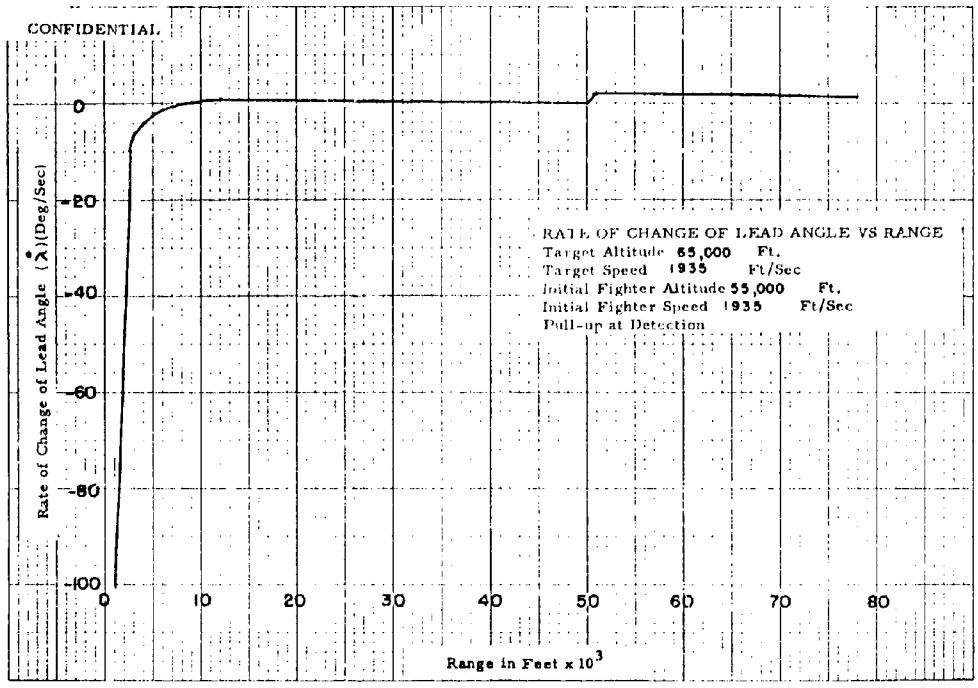


Figure 40


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

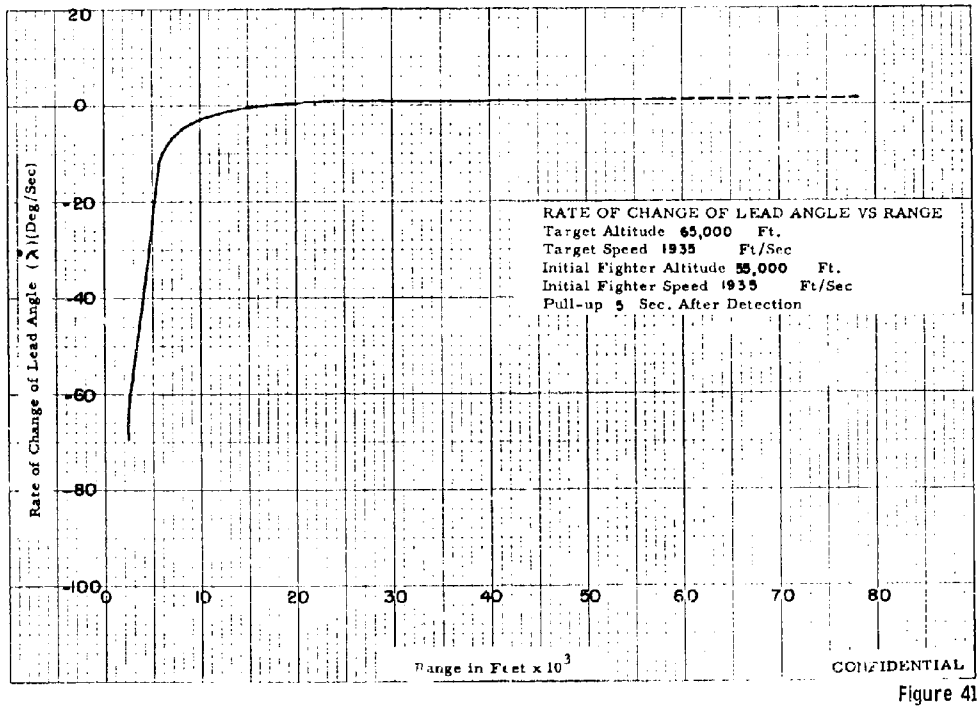
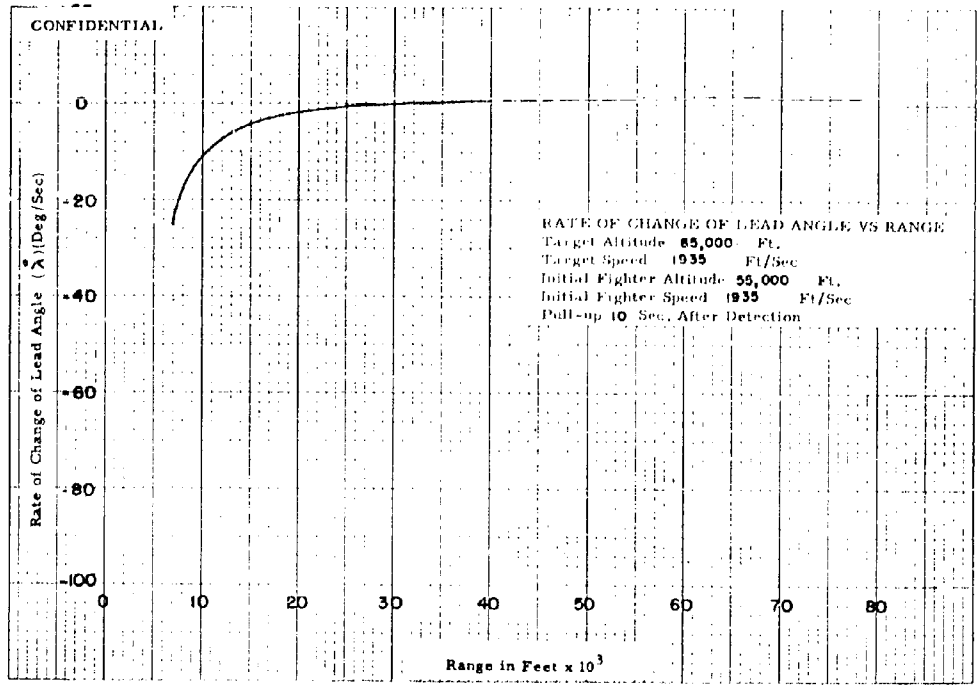

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
20
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

Figure 41


Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection

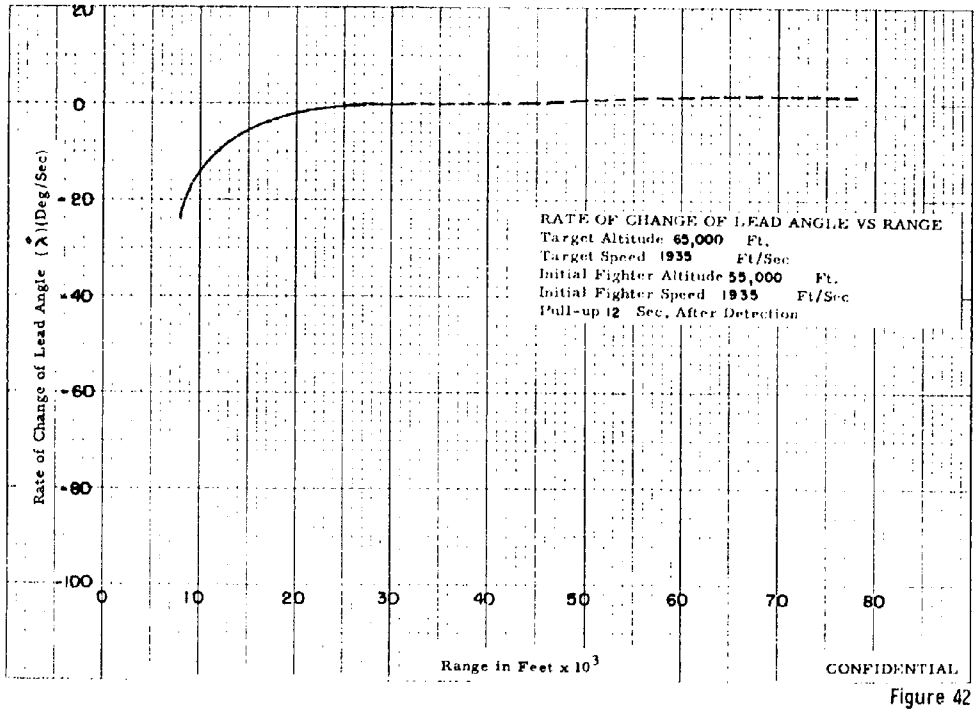

Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
20
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection

Figure 42

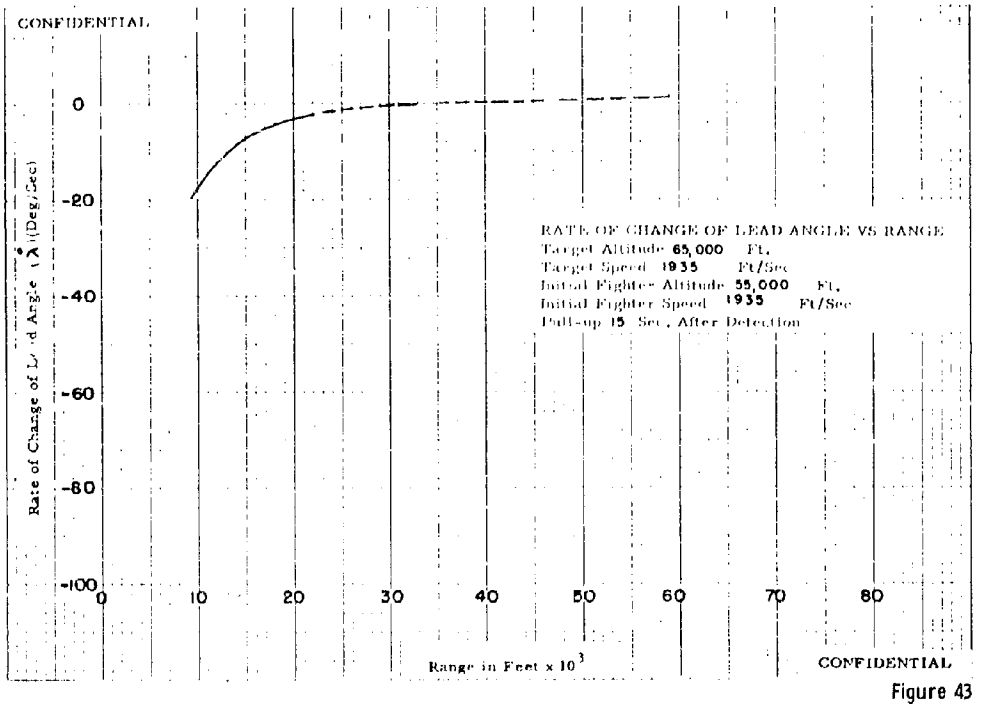


Figure 43

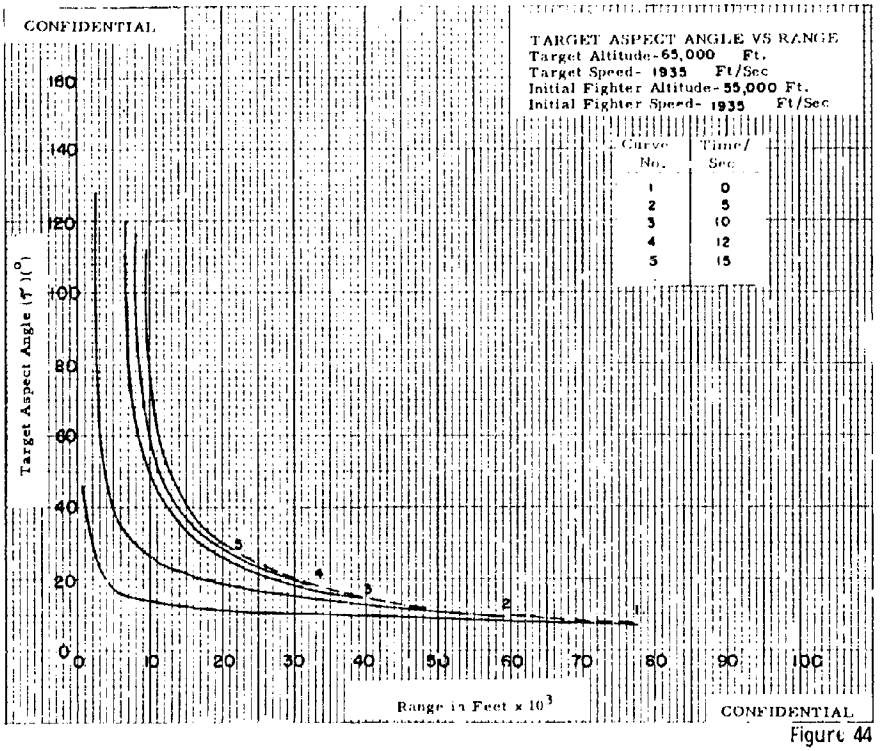
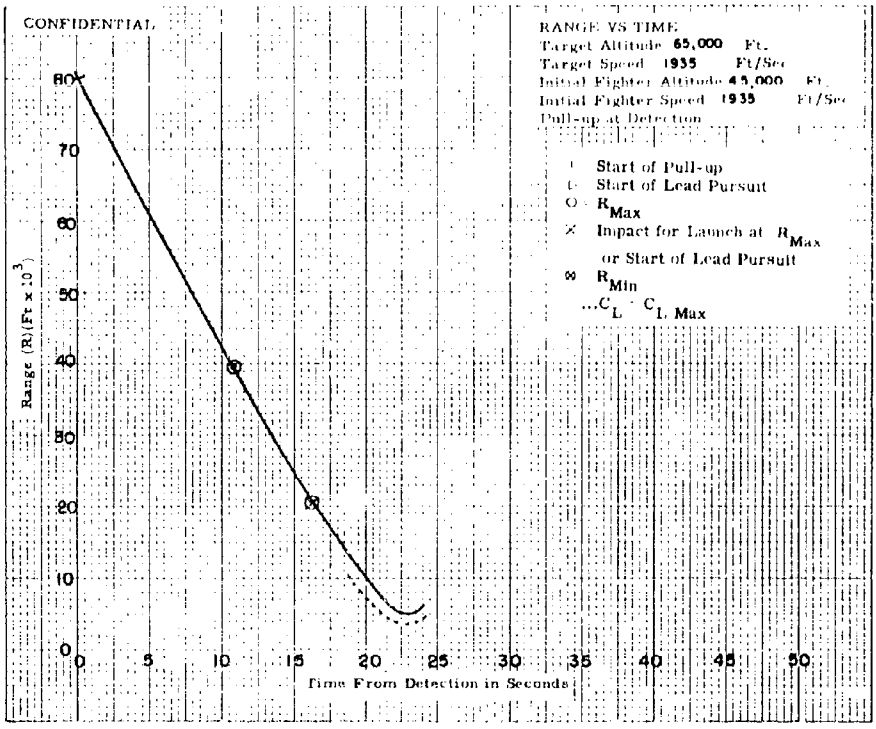


Figure 44


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Start of Pull-up
Start of Lead Pursuit
R_{Max}
Impact for Launch at R_{Max} or Start of Lead Pursuit
R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

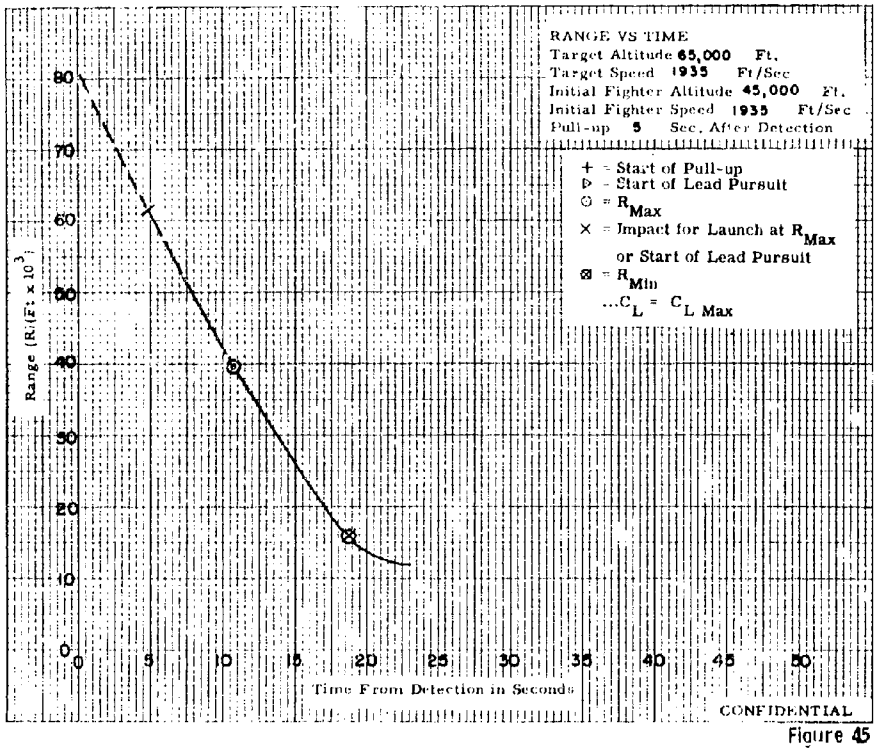
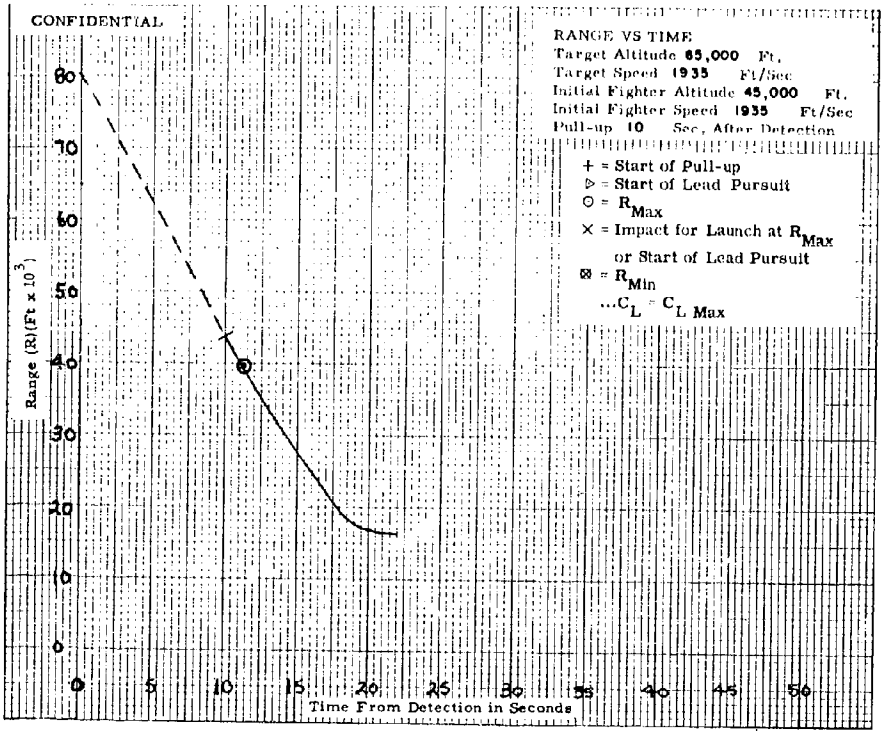

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 45


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

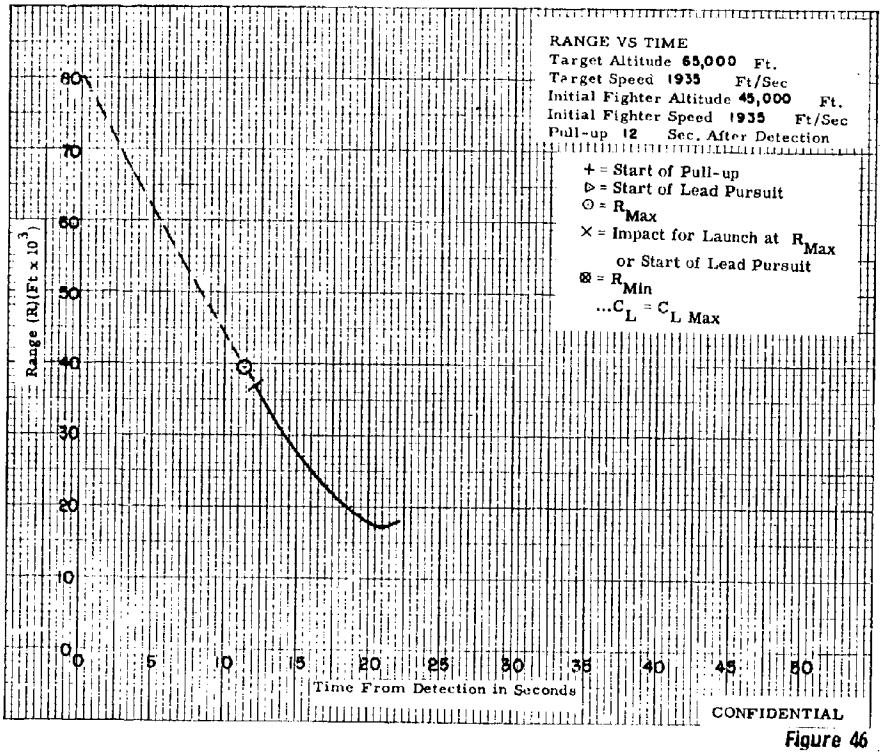
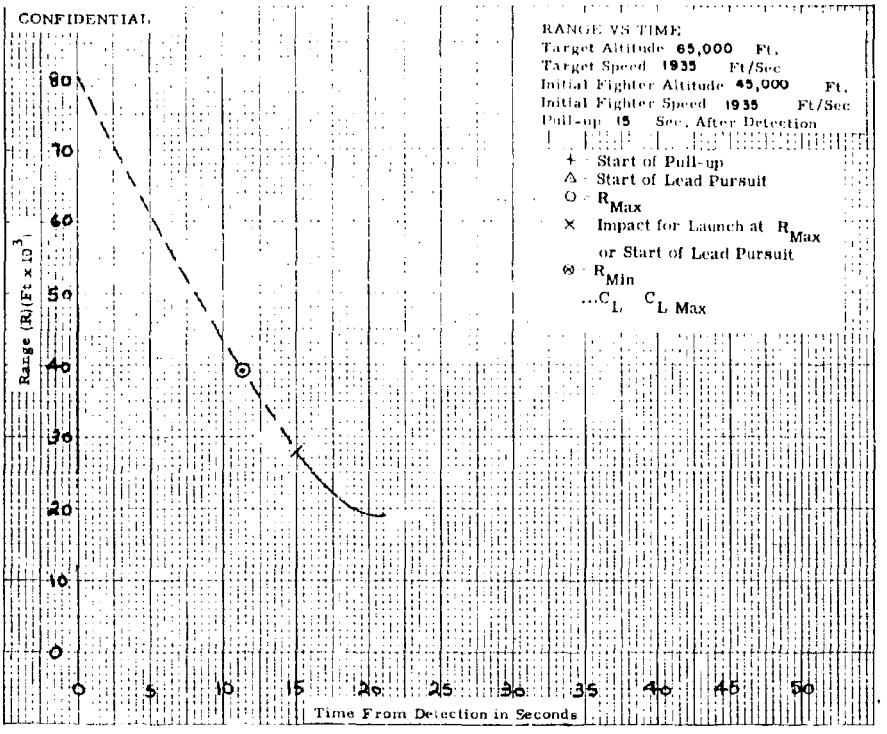

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 46


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
+ Start of Pull-up
△ Start of Lead Pursuit
○ R_{Max}
× Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ R_{Min}
...C_L $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

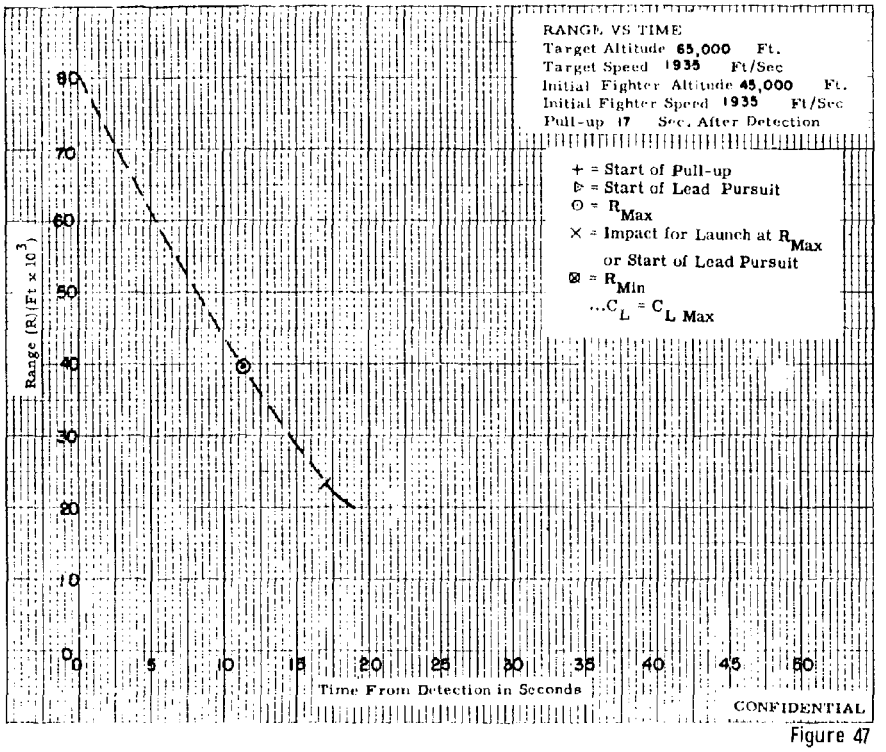
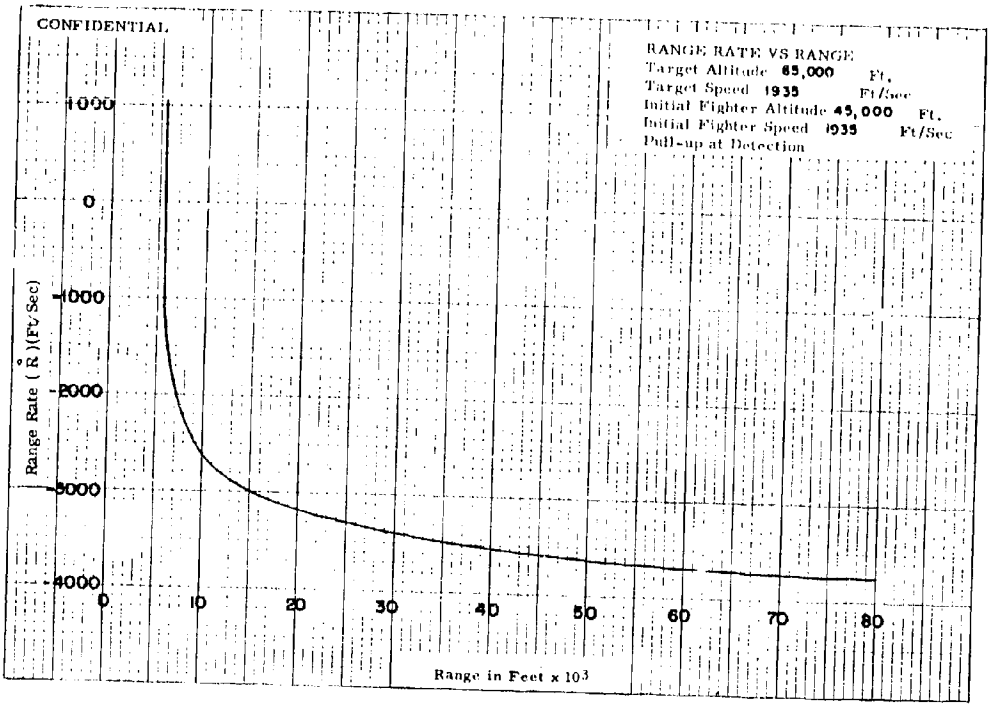

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 17 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 47


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

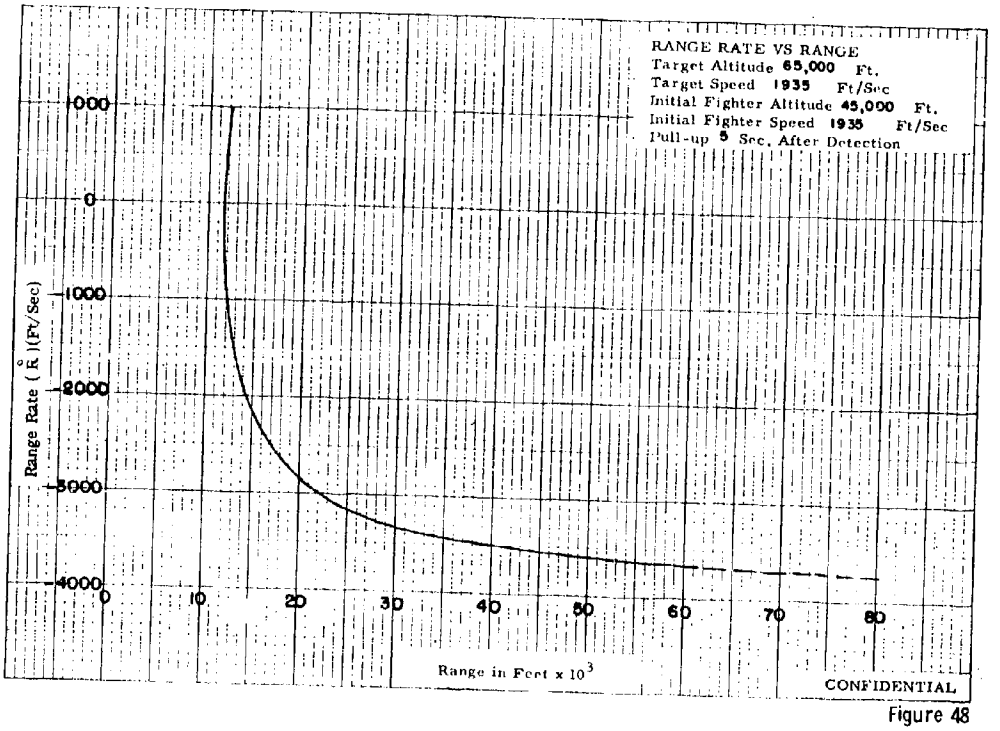
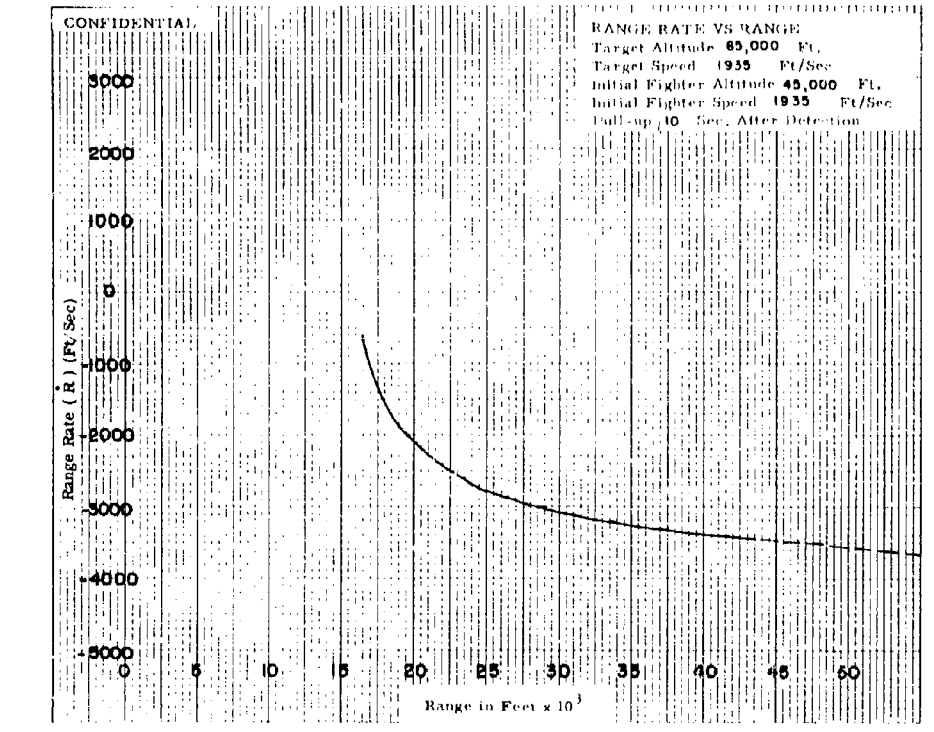

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 48


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
0
5
10
15
20
25
30
35
40
45
50
Range in Feet x 10³

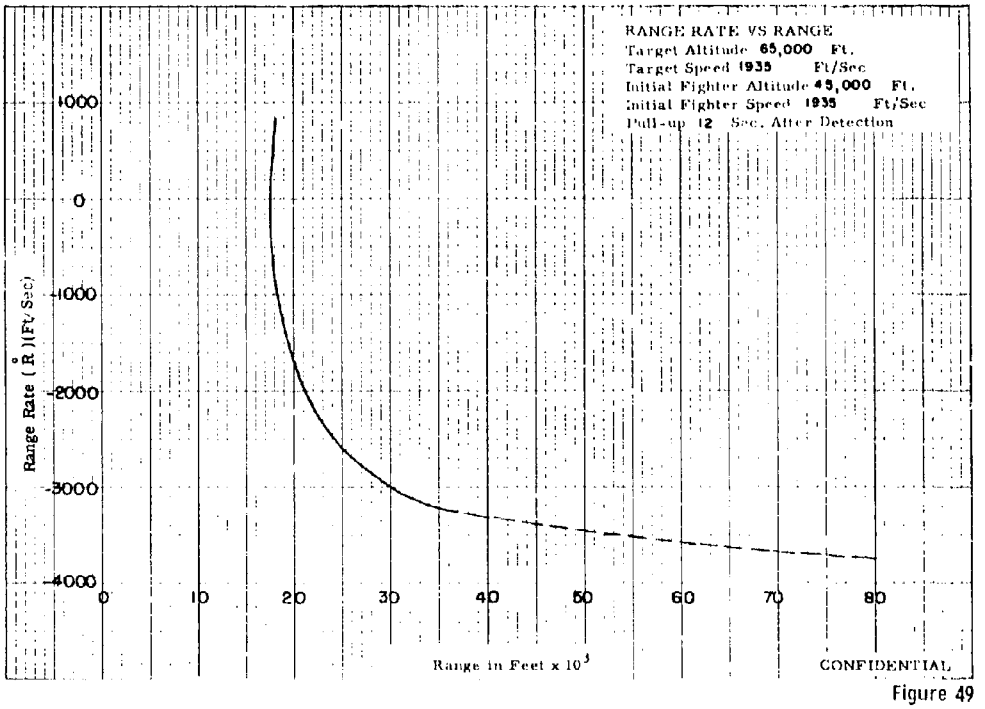
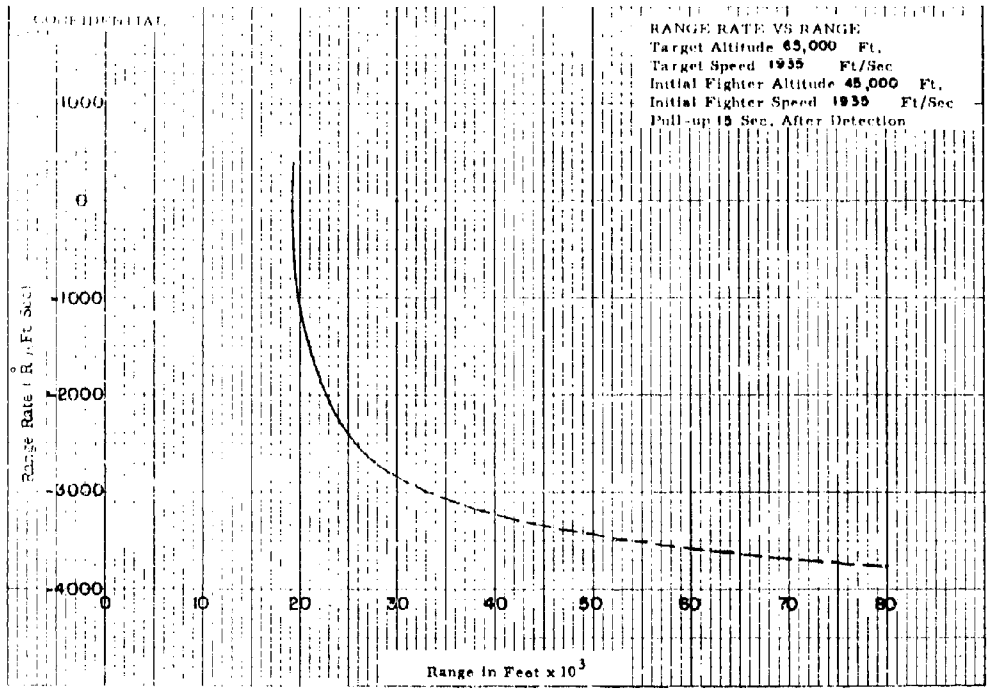

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 49


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
Range Rate ($\dot{R}$), Ft/Sec
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

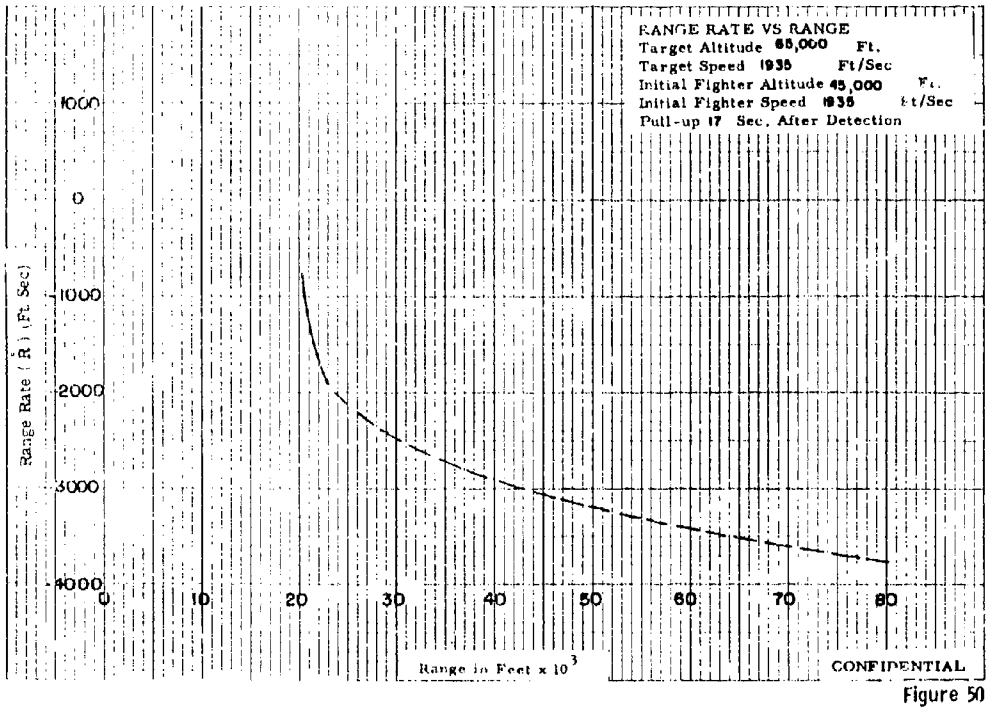

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 17 Sec. After Detection
Range Rate ($\dot{R}$) (Ft Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 50

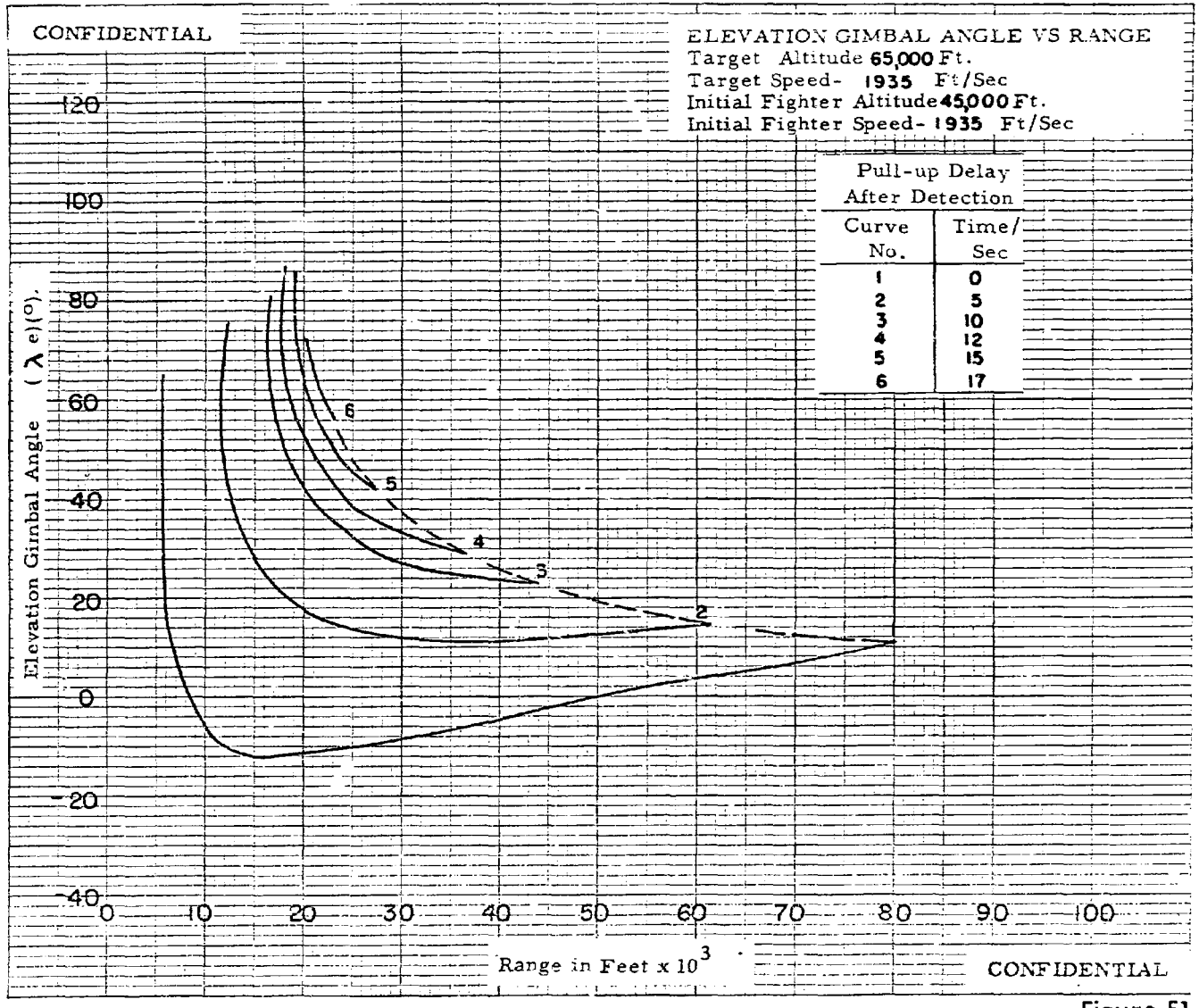
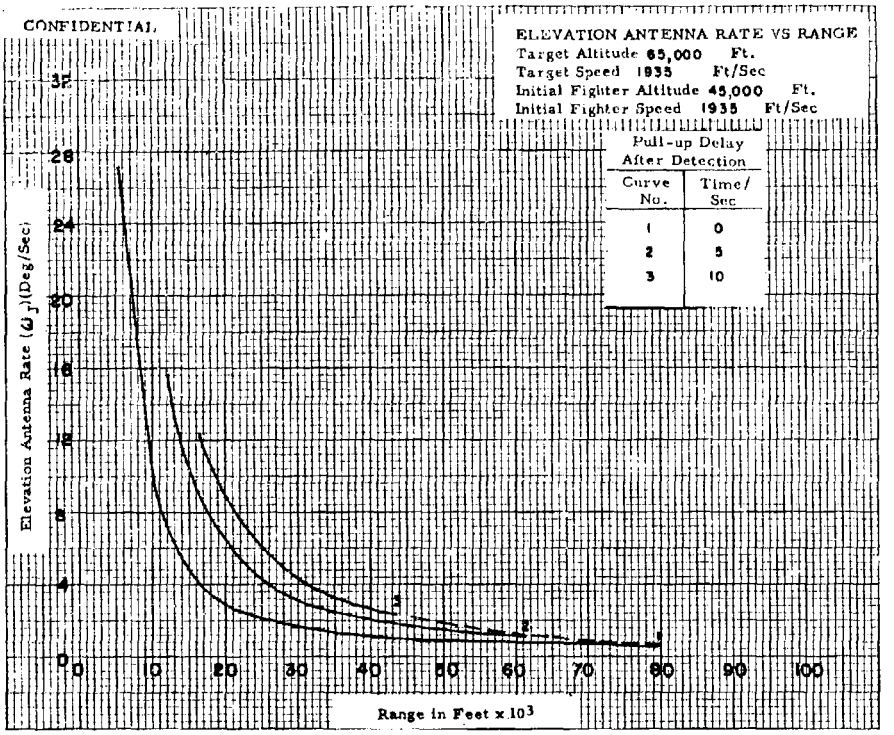

CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 5
3 | 10
4 | 12
5 | 15
6 | 17
Elevation Gimbal Angle (λe)(°).
120
100
80
60
40
20
0
-20
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 51


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 5
3 | 10
Elevation Antenna Rate (ω_J)(Deg/Sec)
Range in Feet x 10^3

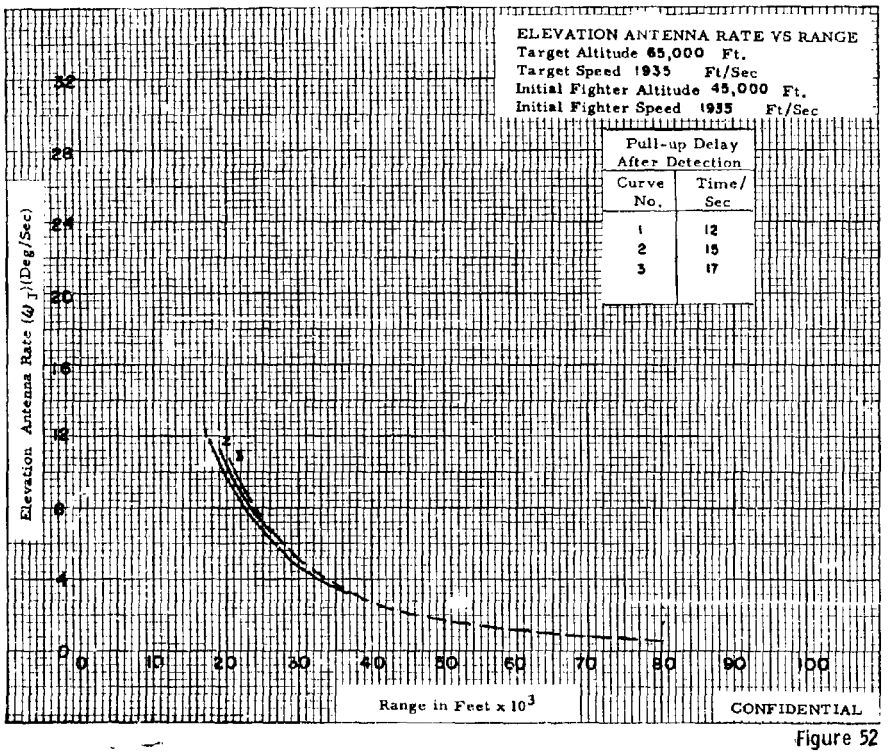

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 12
2 | 15
3 | 17
Elevation Antenna Rate (ω_J)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 52

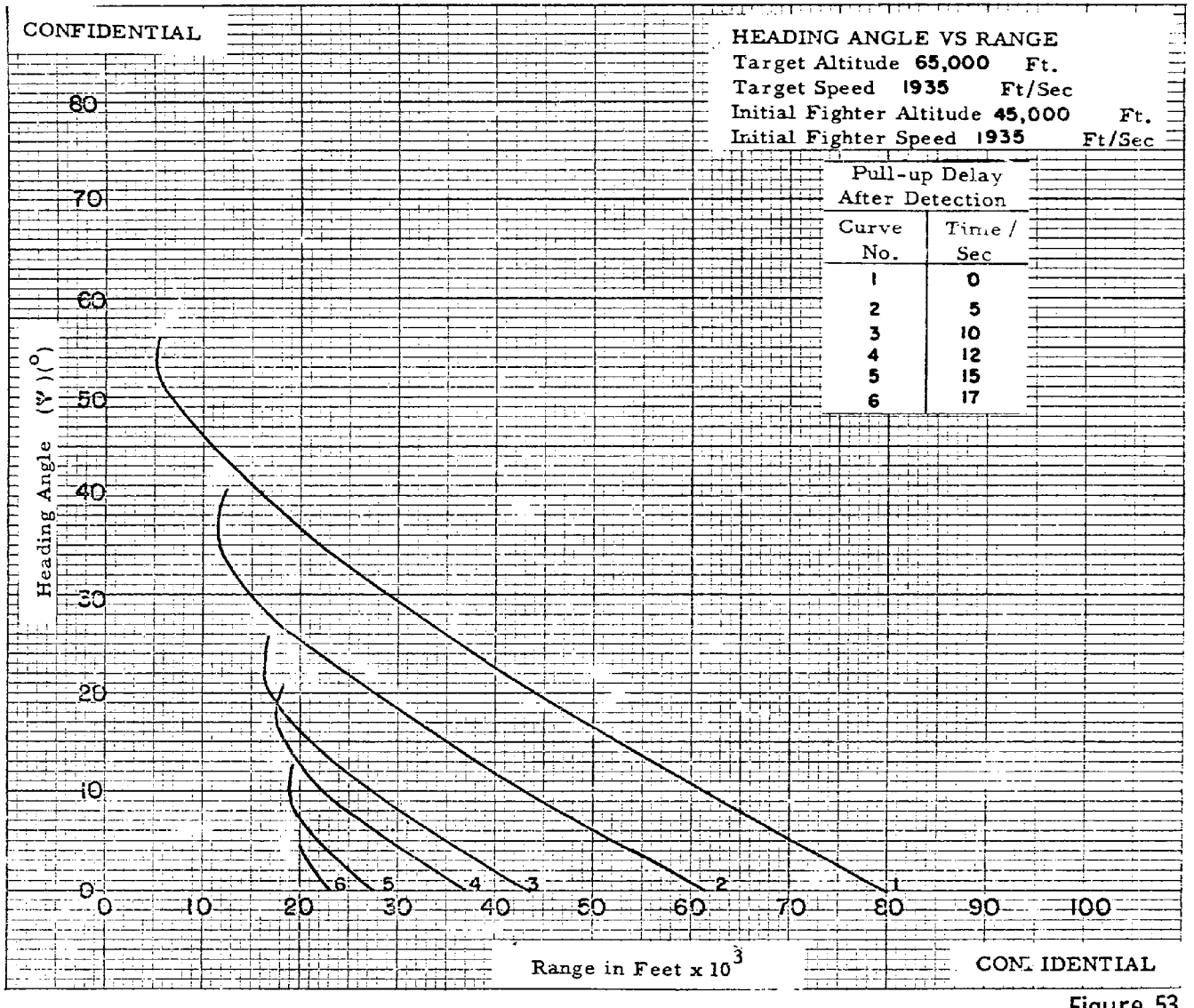
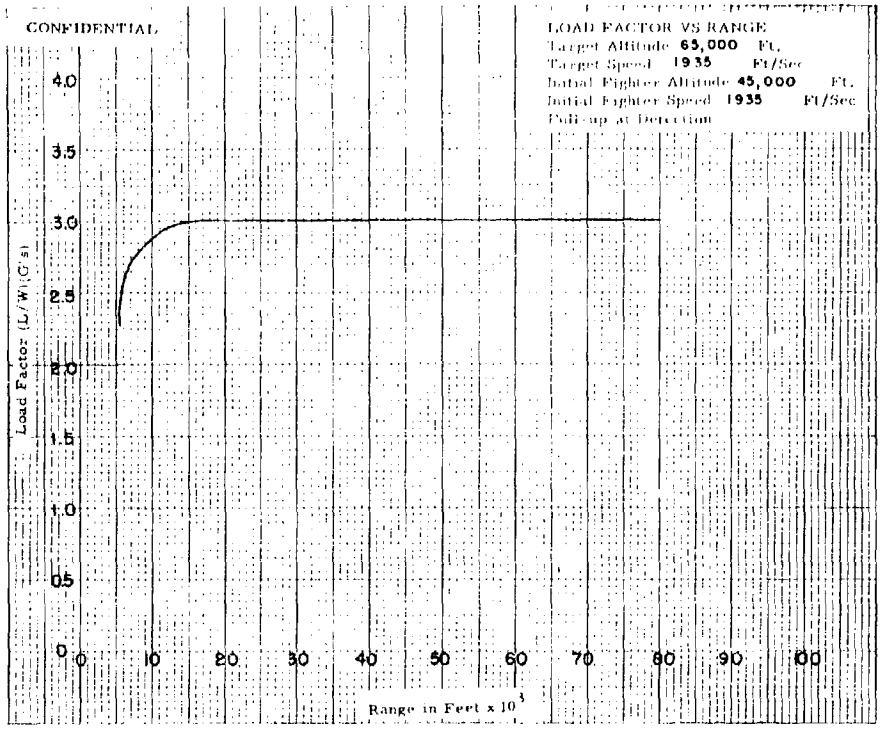

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time / Sec
1 | 0
2 | 5
3 | 10
4 | 12
5 | 15
6 | 17
Heading Angle (Ψ) (°)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
1
2
3
4
5
6
Range in Feet x 10^3
CONFIDENTIAL

Figure 53


LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

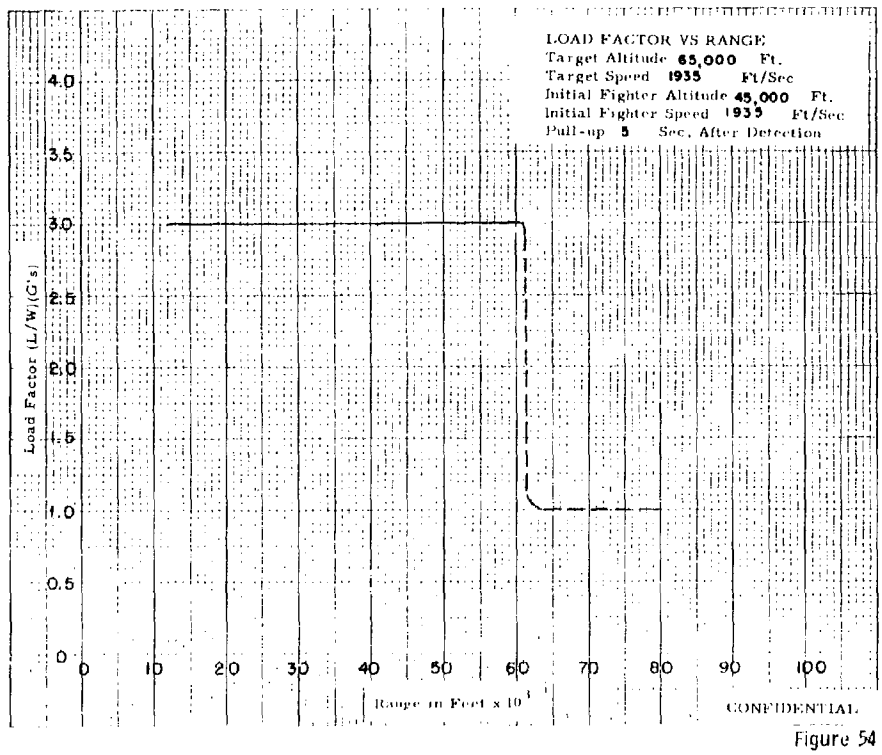
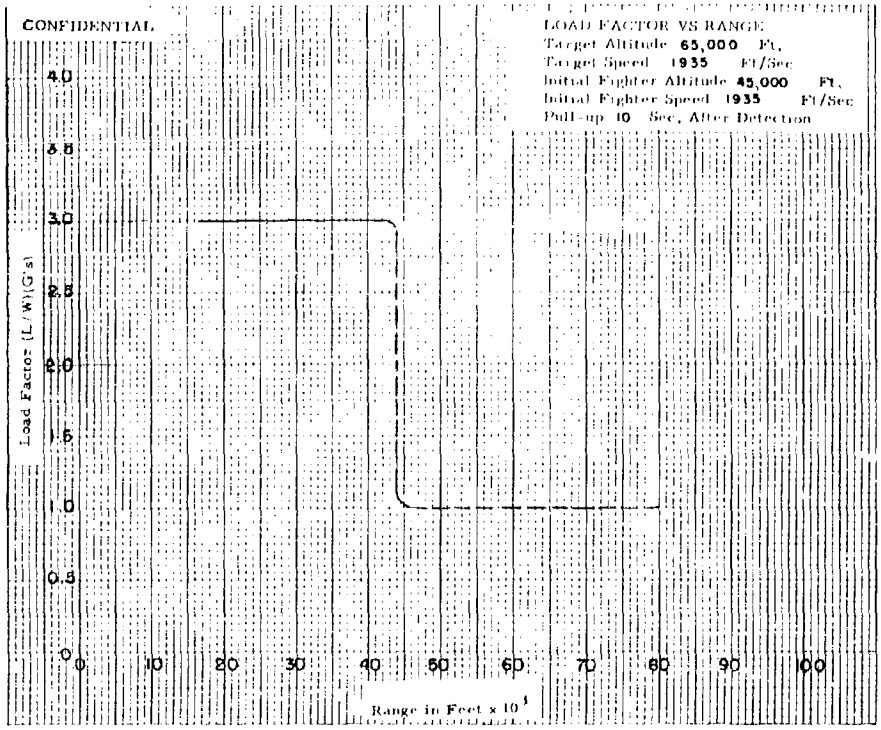

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

Figure 54


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10³

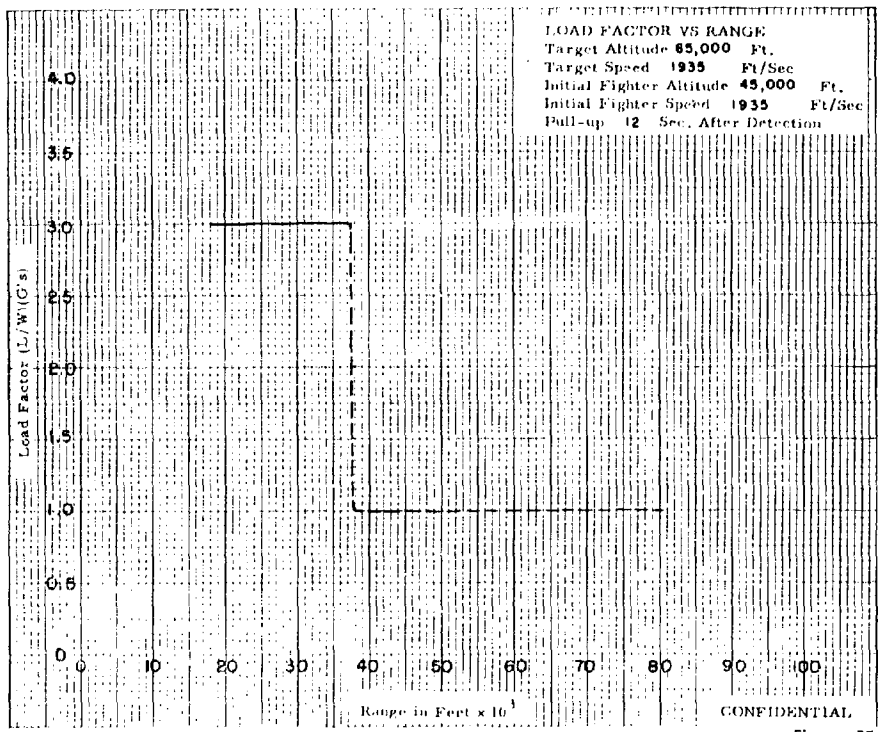
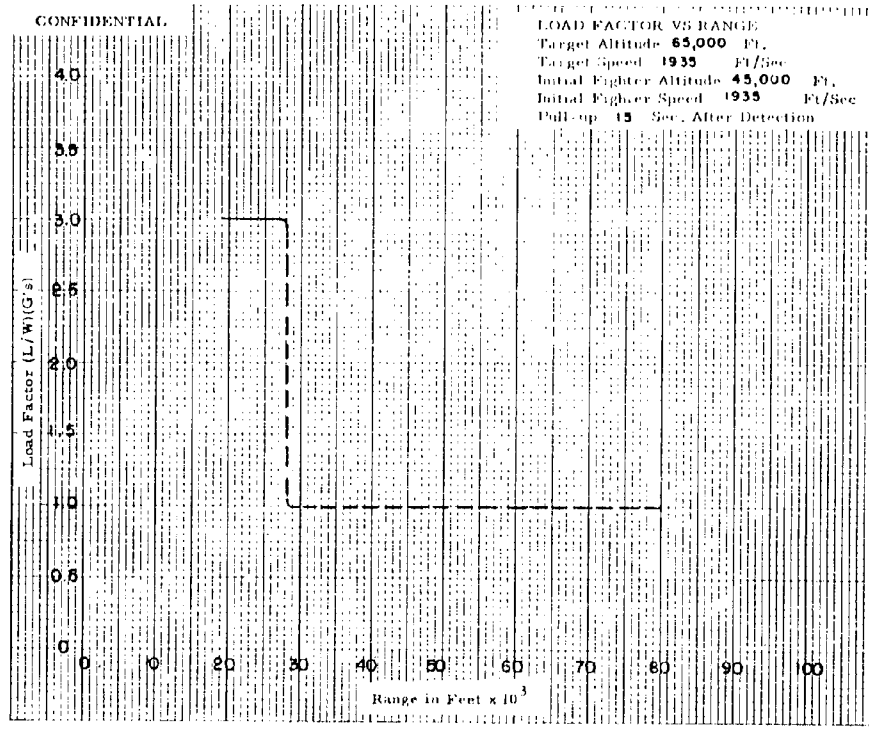

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10³
CONFIDENTIAL

Figure 55


LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

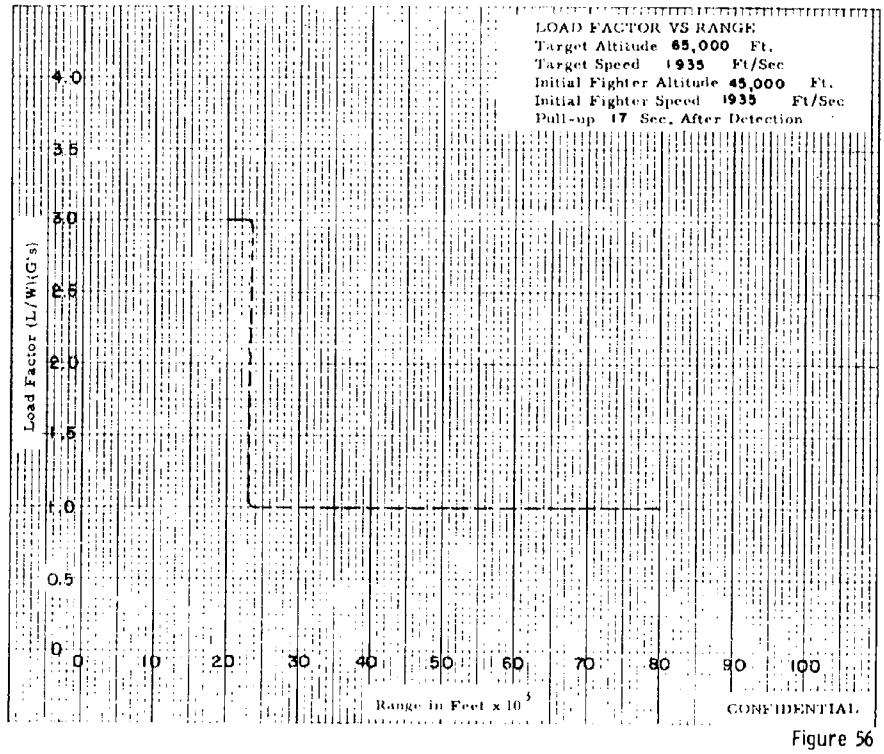

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 17 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

Figure 56

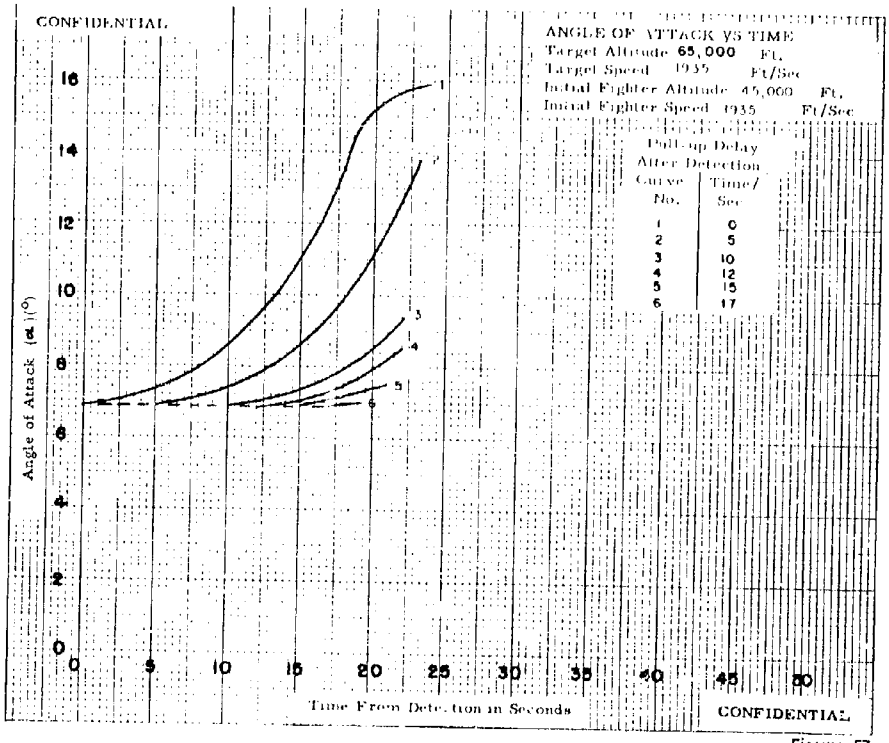


Figure 57

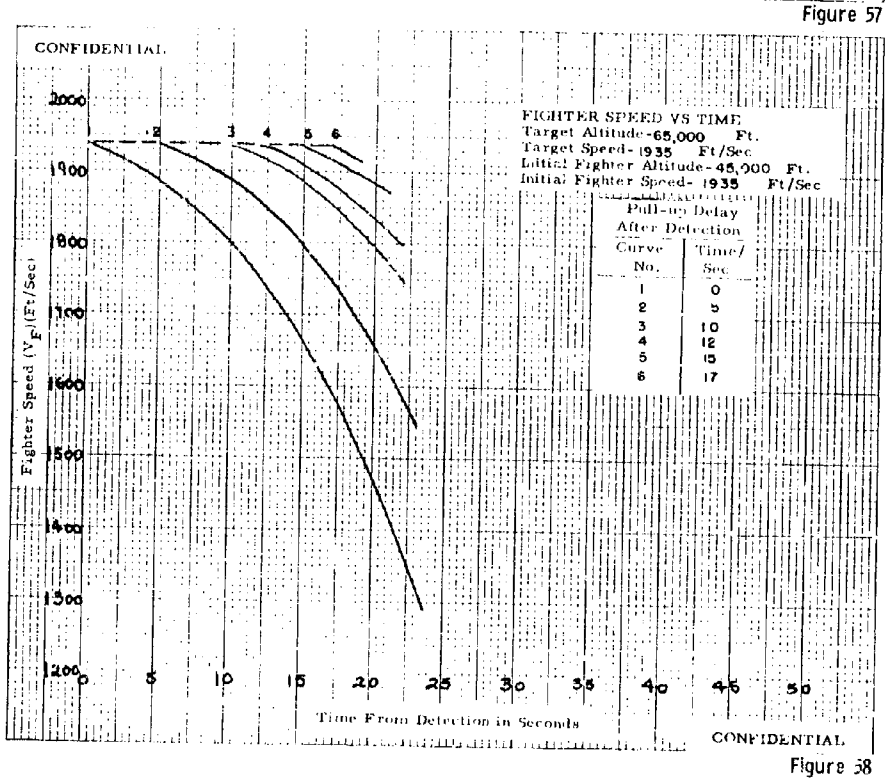
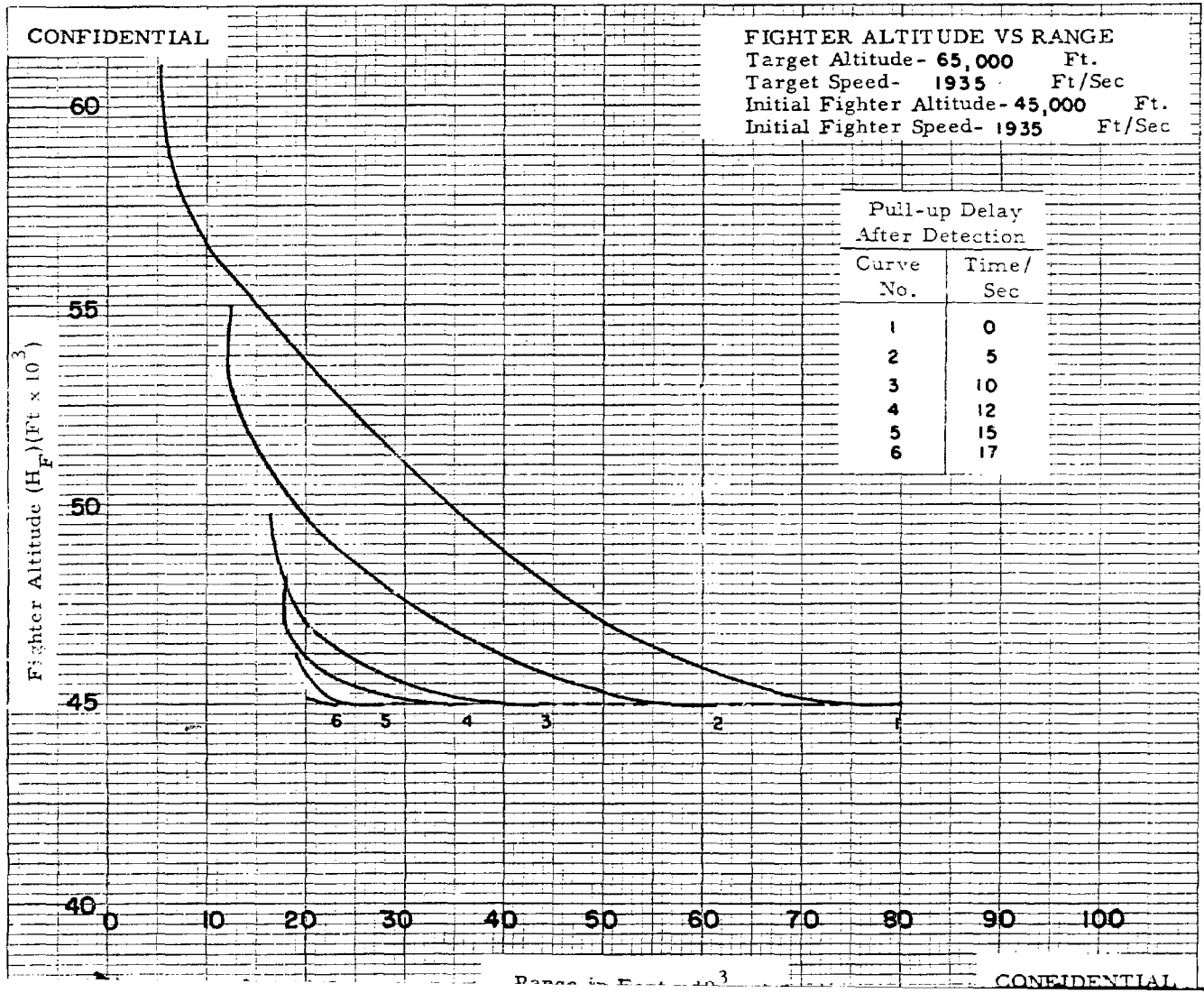
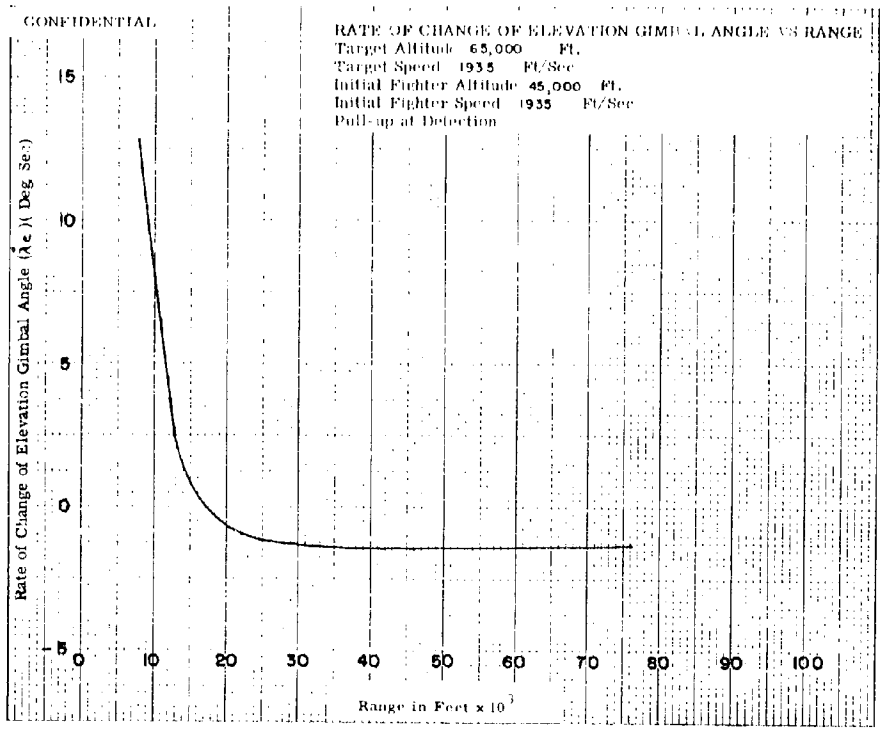


Figure 58

CONFIDENTIAL



CONFIDENTIAL


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle (Δe) (Deg/Sec)
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

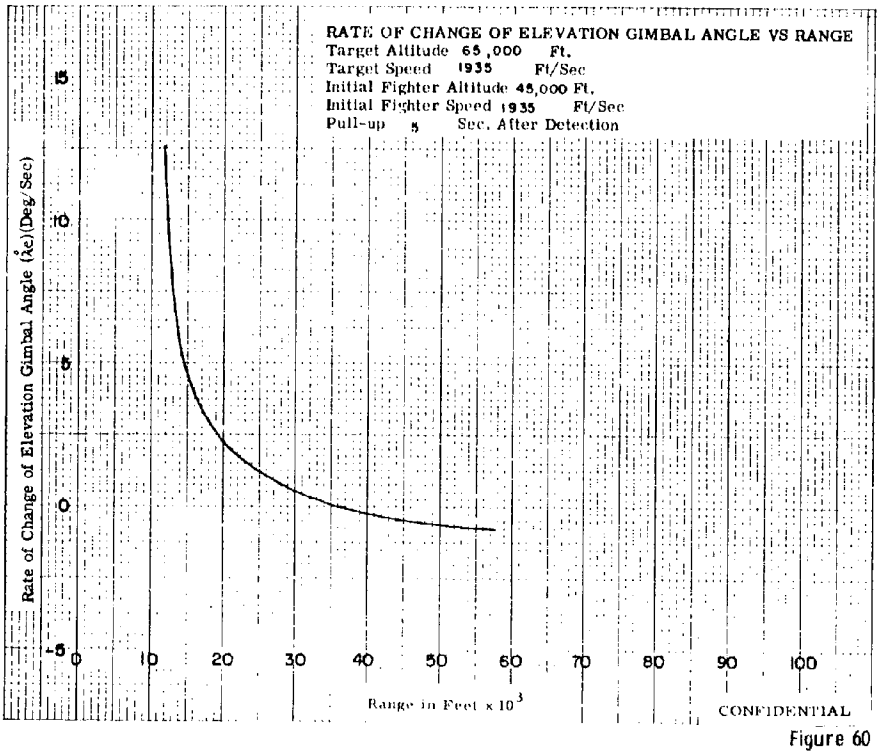

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (Δe) (Deg/Sec)
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 60

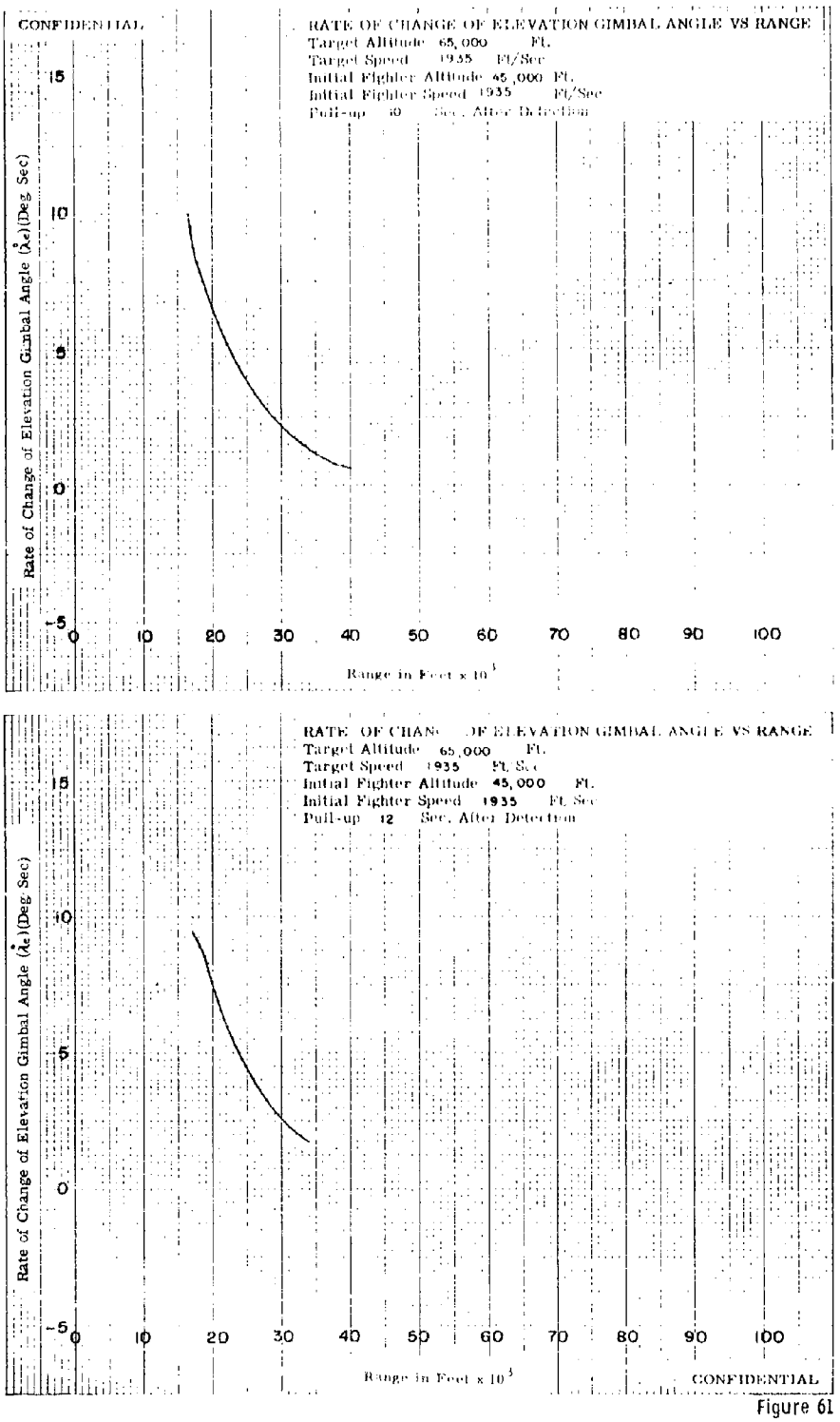

CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (Ae)(Deg Sec)
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft. Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft Sec
Pull-up 12 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (Ae)(Deg Sec)
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 61

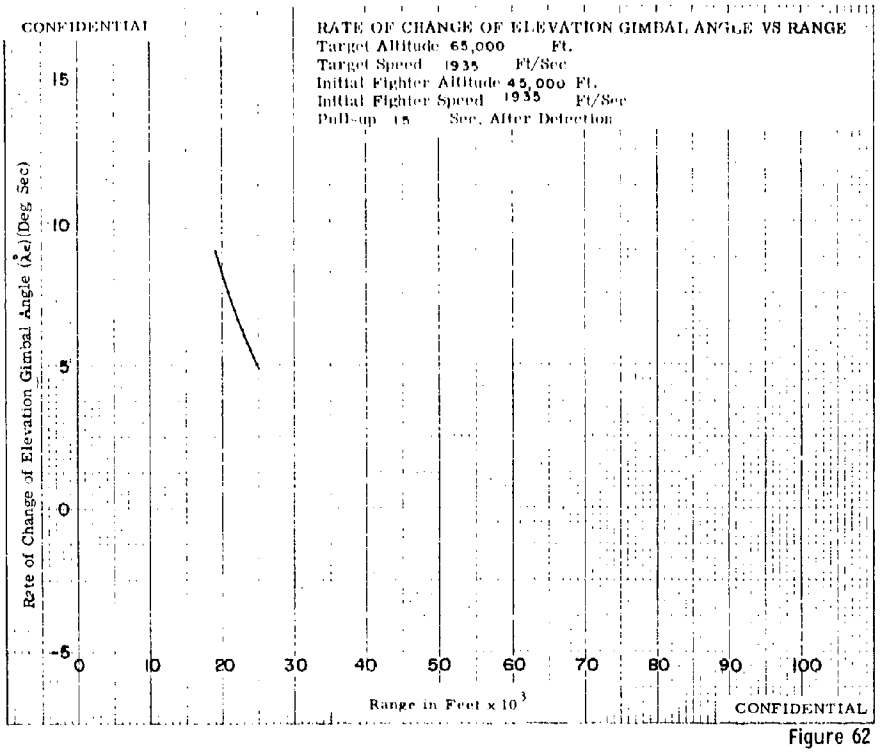


Figure 62

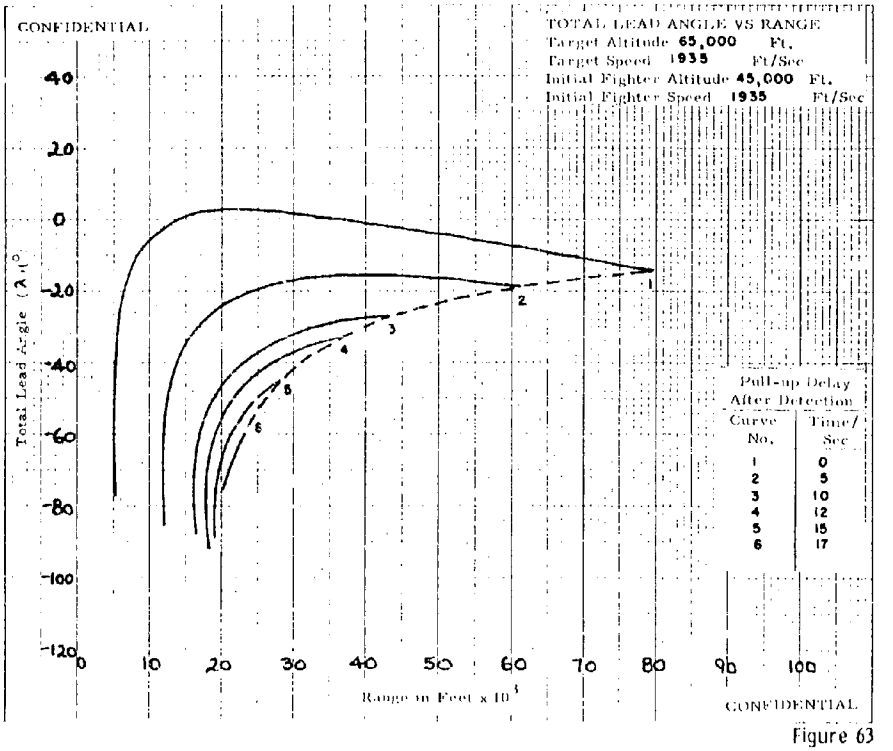
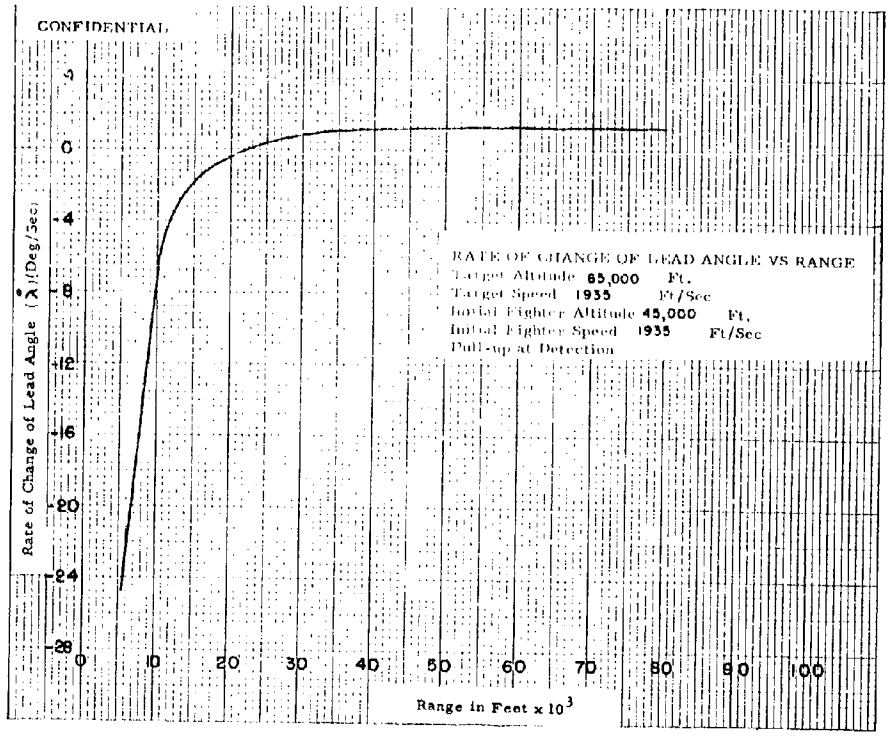


Figure 63


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
Range in Feet x 10³

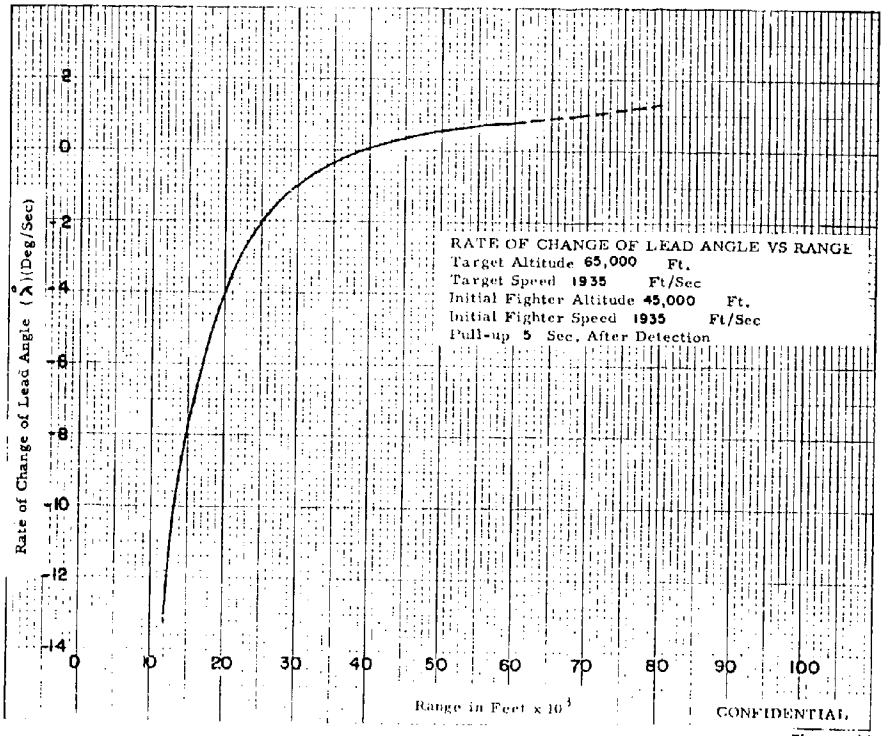
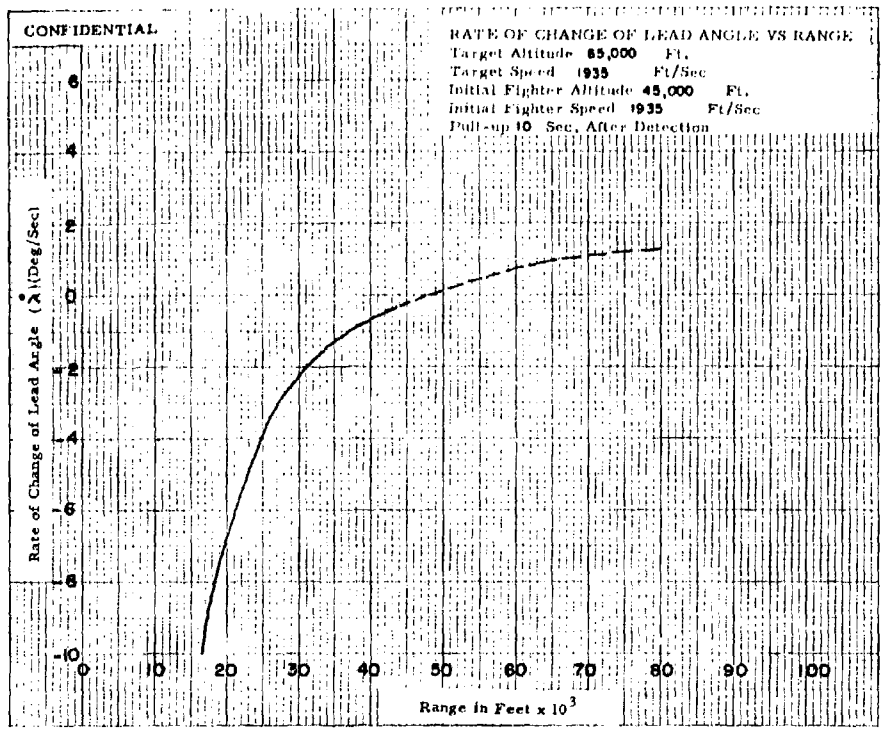

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
Range in Feet x 10³
CONFIDENTIAL

Figure 64


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
6
4
2
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

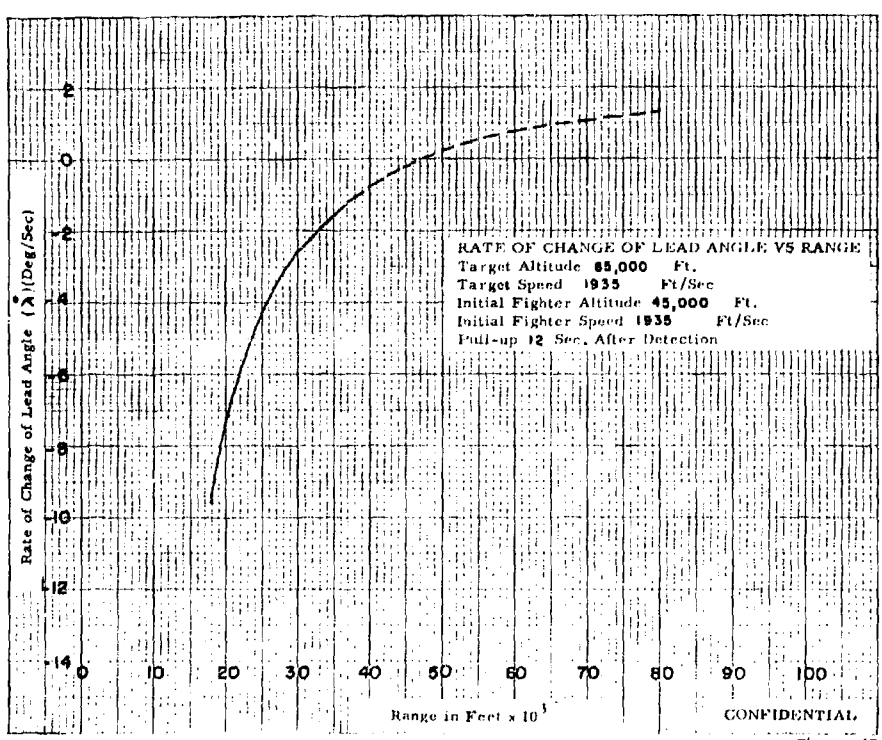
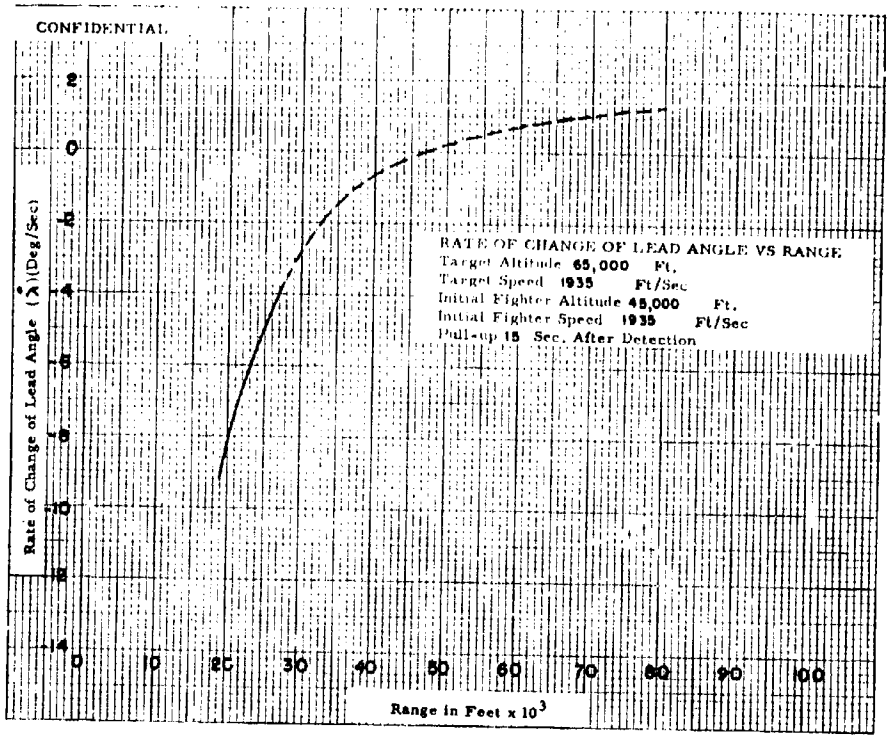
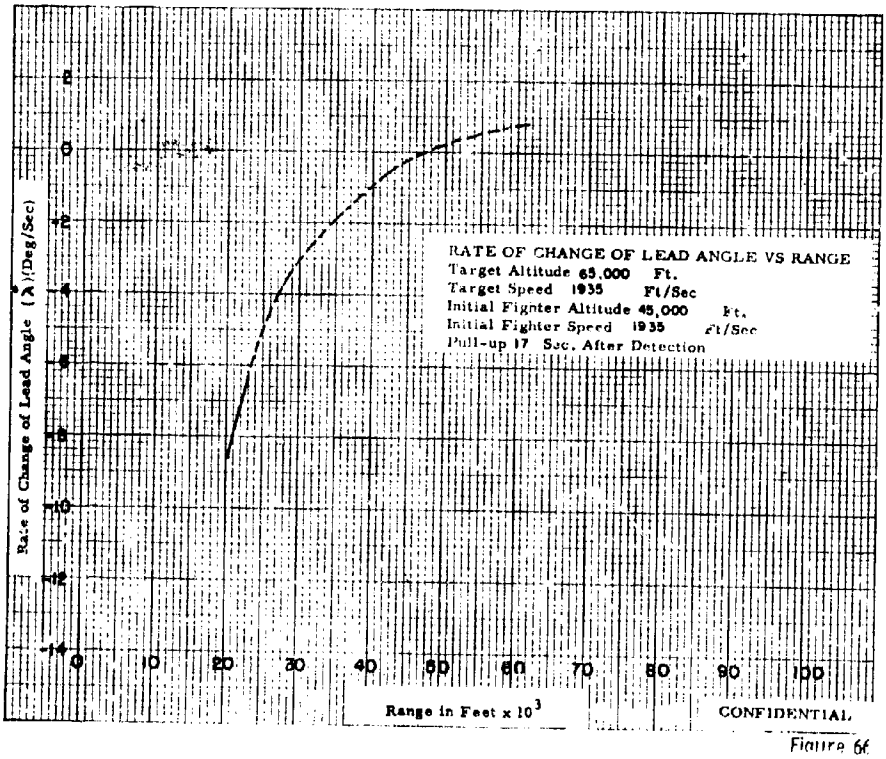

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
2
0
-2
-4
-6
-8
-10
-12
-14
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 65

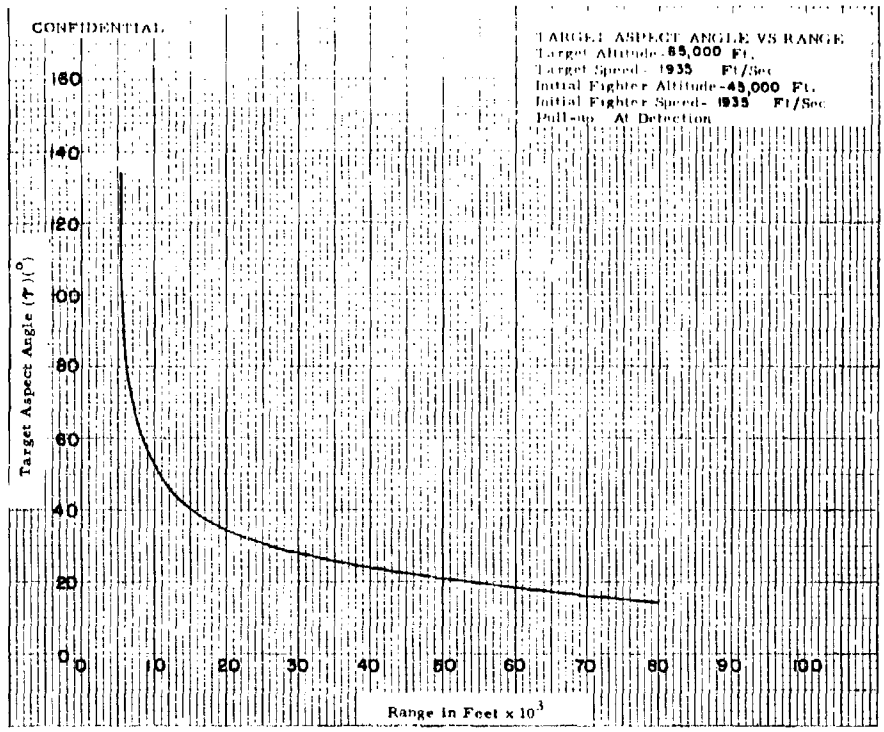
CONFIDENTIAL





CONFIDENTIAL

Figure 6


TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude-45,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up At Detection
Target Aspect Angle (ψ)(°)
0
20
40
60
80
100
120
140
160
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

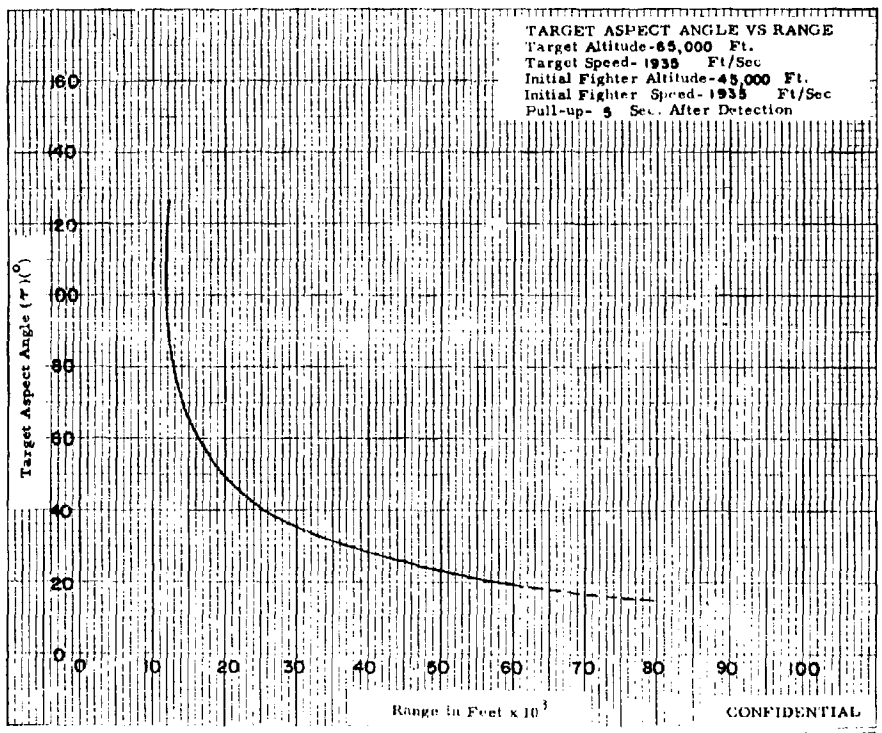
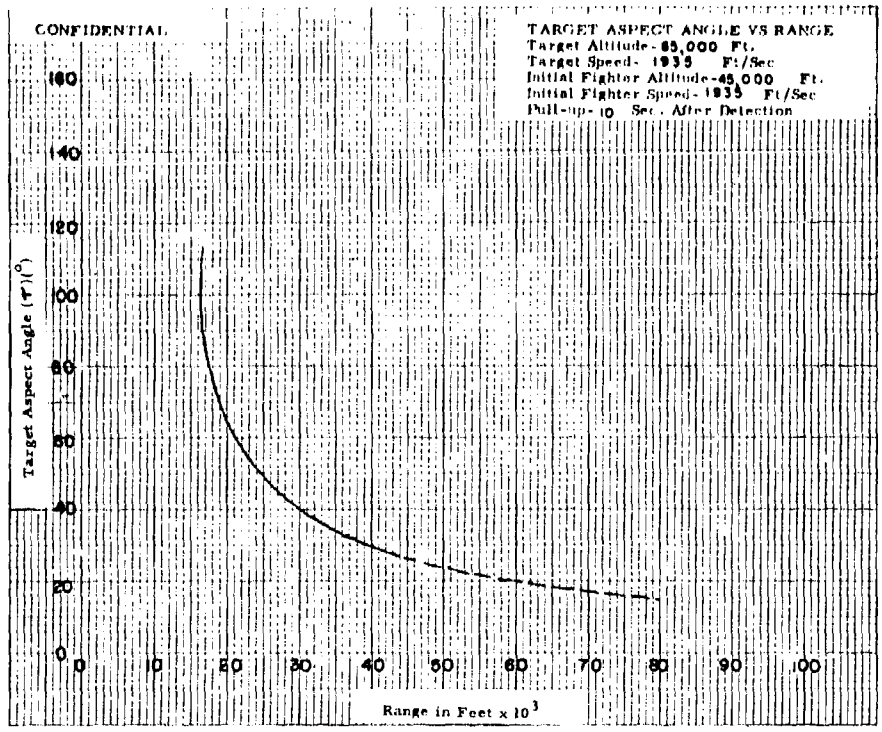

TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude-45,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up- 5 Sec. After Detection
Target Aspect Angle (ψ)(°)
0
20
40
60
80
100
120
140
160
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 67


CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude-45,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up- 10 Sec. After Detection
Target Aspect Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

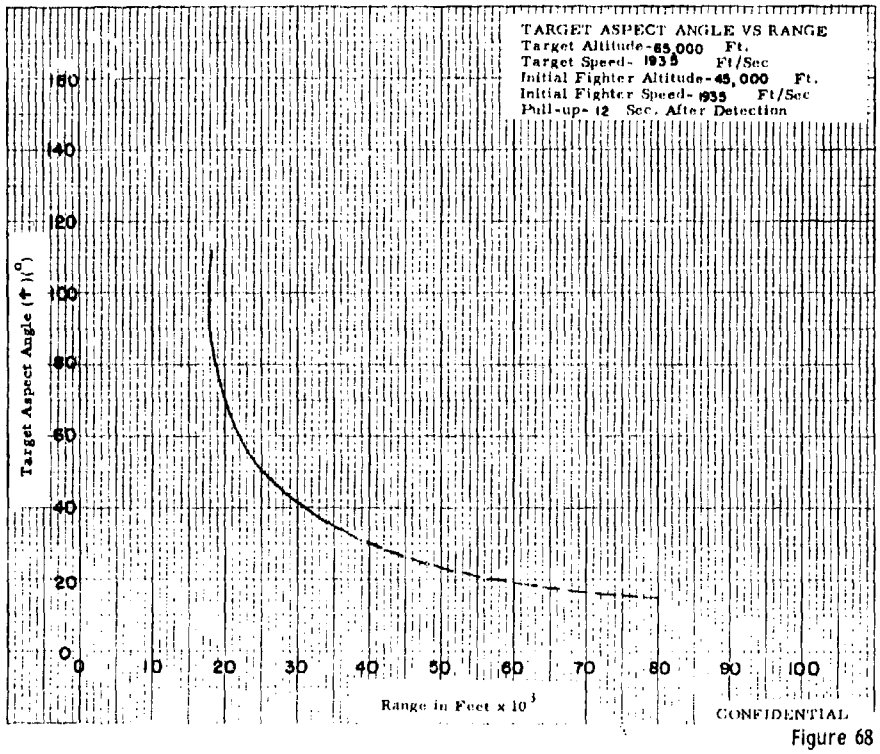
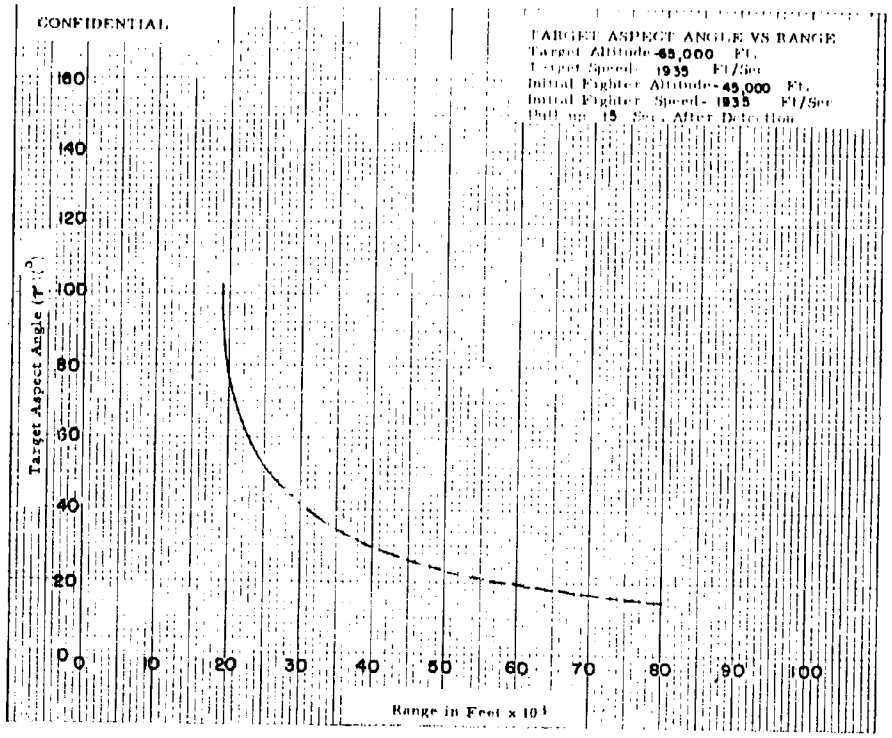

TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude-45,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up- 12 Sec. After Detection
Target Aspect Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 68


CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude- 45,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up- 15 Sec. After Detection
Target Aspect Angle (Γ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

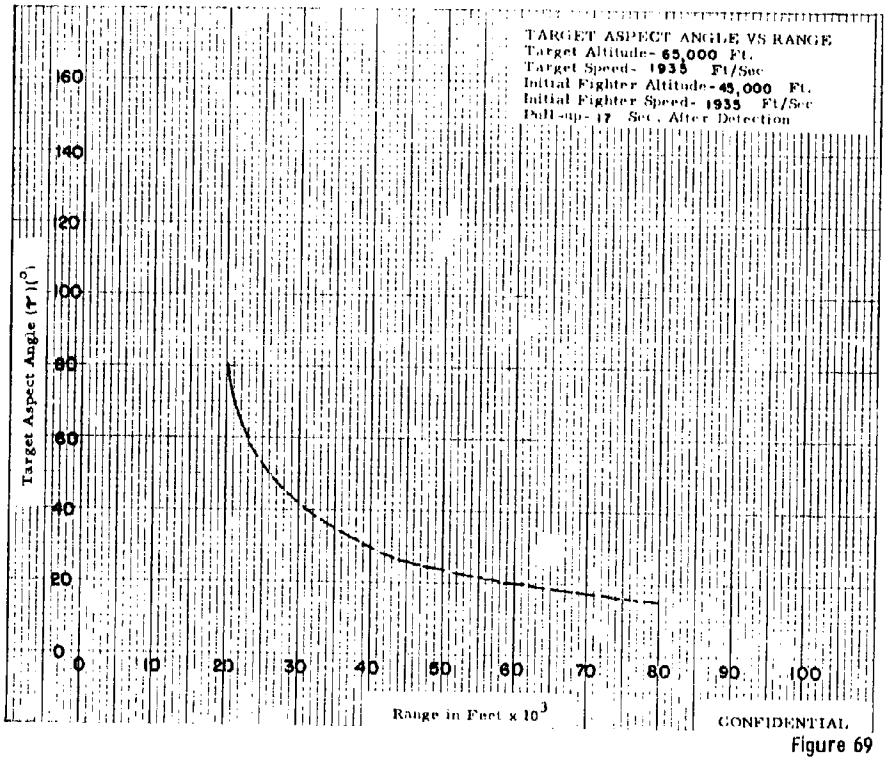
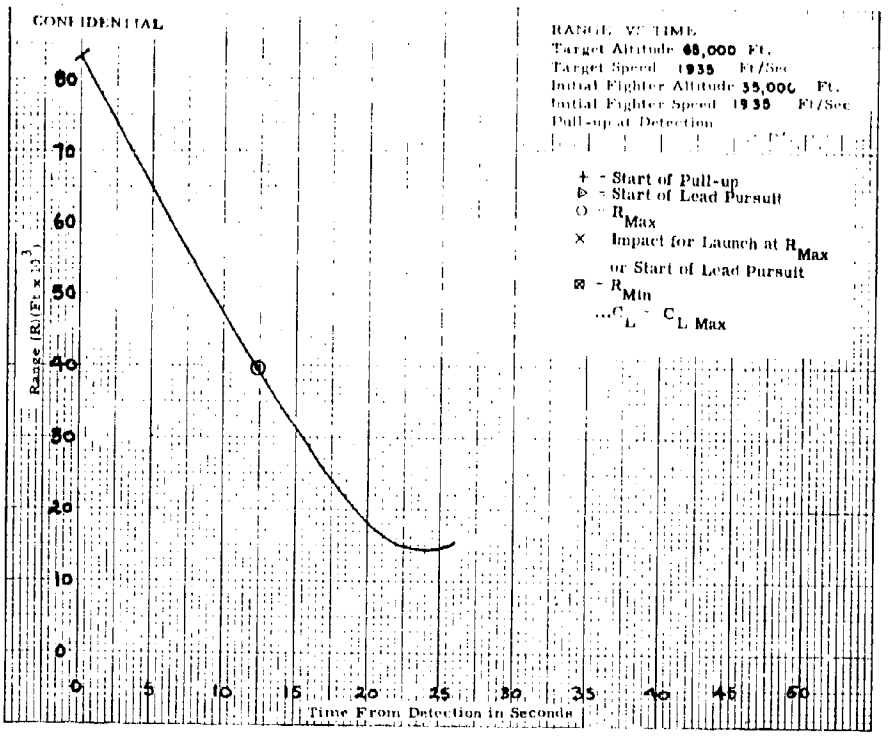

TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude- 45,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up- 17 Sec. After Detection
Target Aspect Angle (Γ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 69


RANGE VS TIME
Target Altitude 68,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

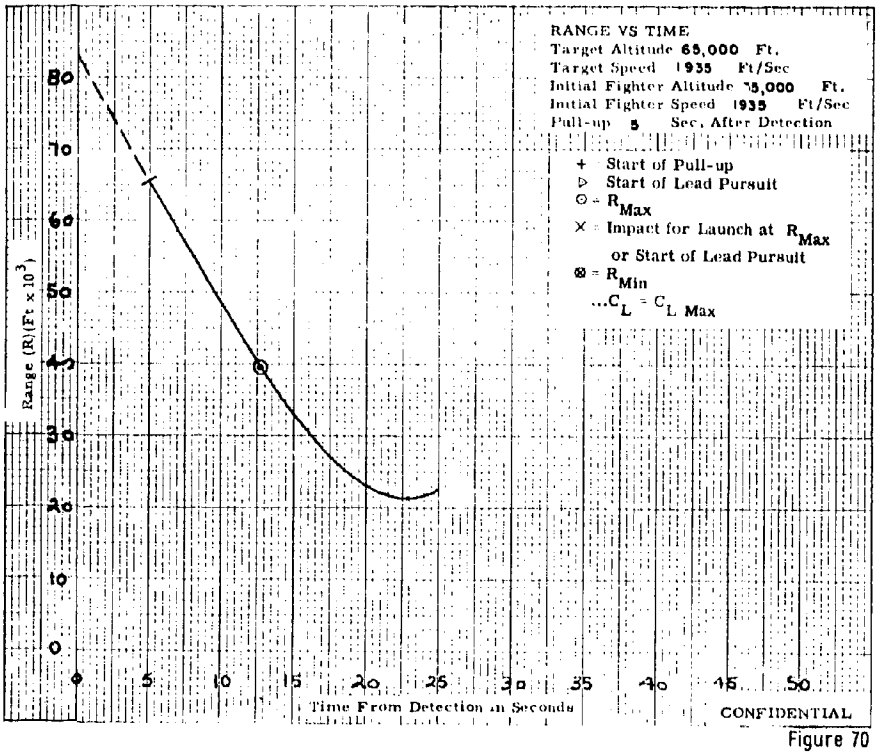
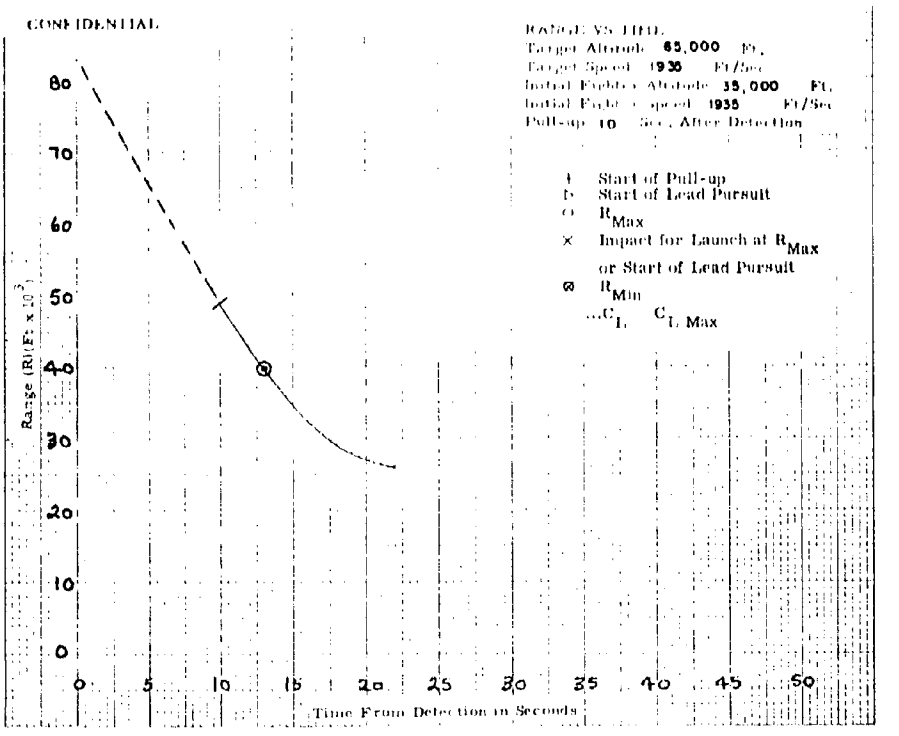

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
+ Start of Pull-up
▷ Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

Figure 70


RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Start of Pull-up
Start of Lead Pursuit
R_{Max}
Impact for Launch at R_{Max} or Start of Lead Pursuit
R_{Min}
C_L $C_{L\ Max}$
Range (R) (Ft. x 10^3)
Time From Detection in Seconds

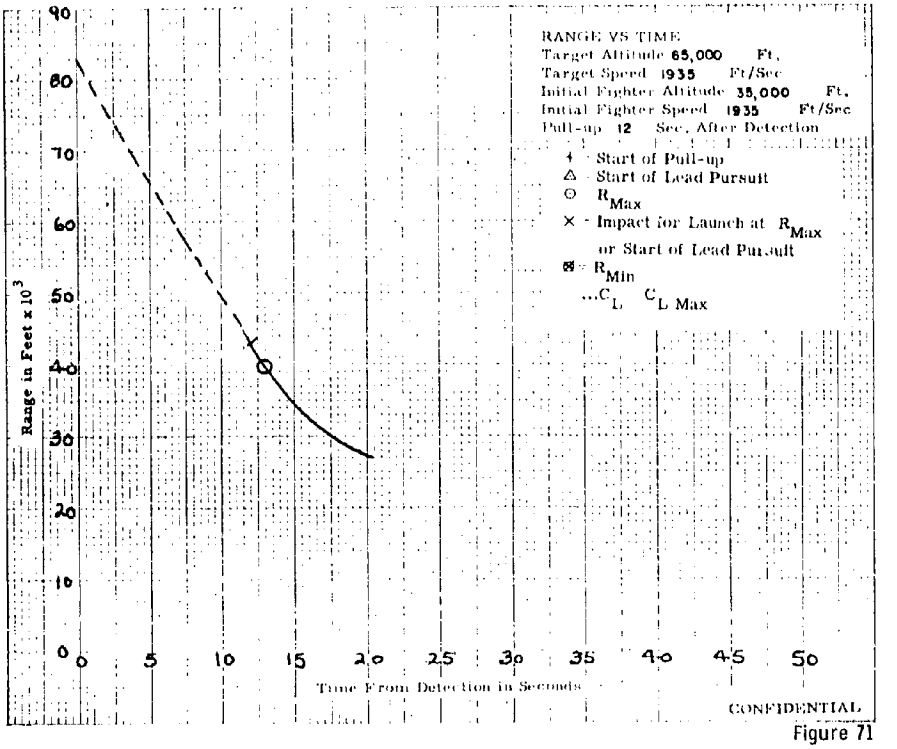

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
Start of Pull-up
Start of Lead Pursuit
R_{Max}
Impact for Launch at R_{Max} or Start of Lead Pursuit
R_{Min}
C_L $C_{L\ Max}$
Range in Feet x 10^3
Time From Detection in Seconds

Figure 71

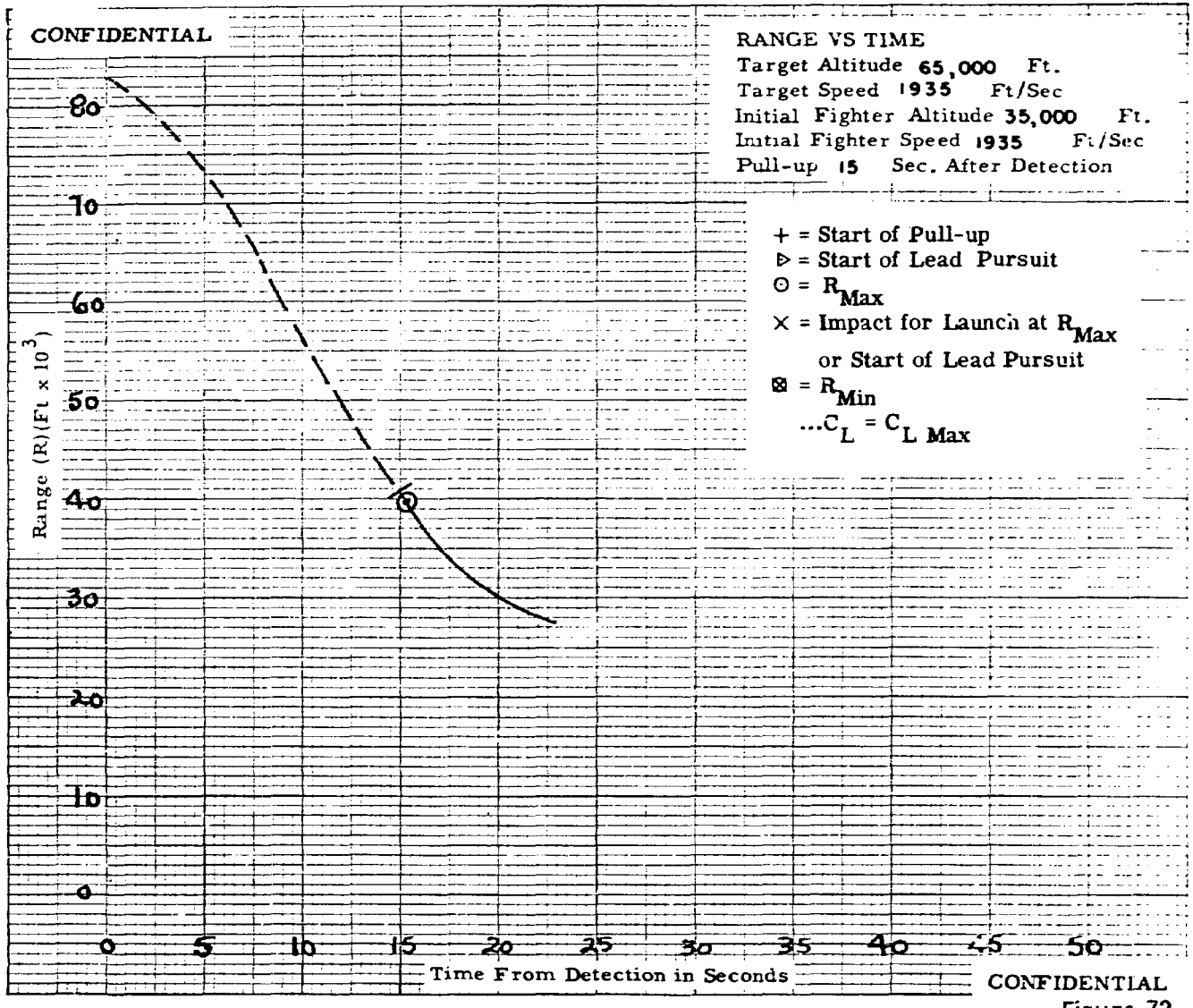
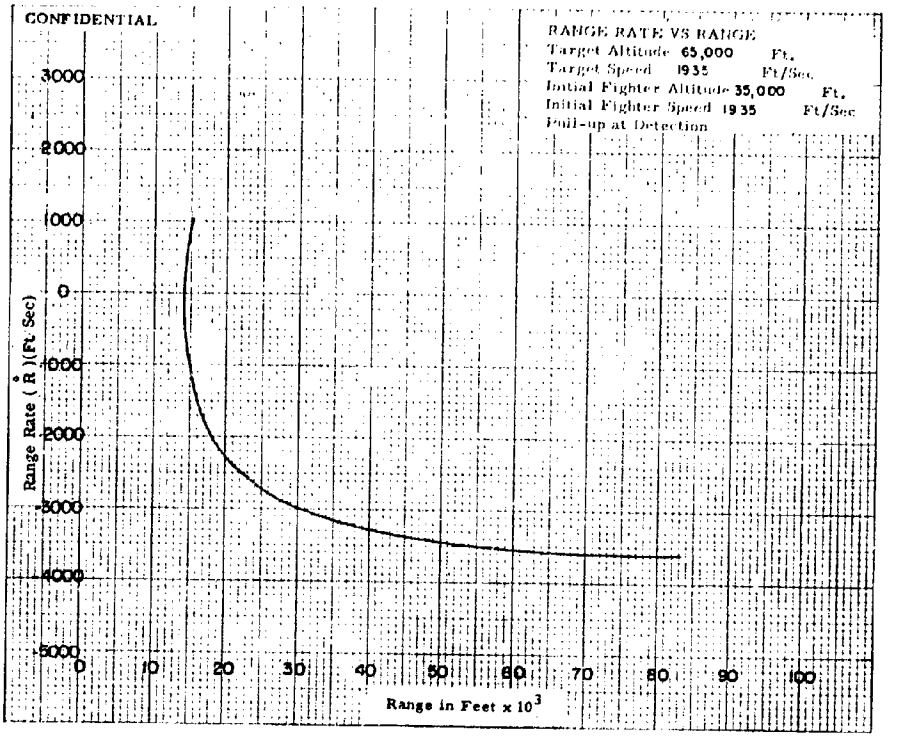

CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
80
70
60
50
40
30
20
10
0
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds
CONFIDENTIAL

Figure 72


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec.
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ)(Ft/Sec)
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

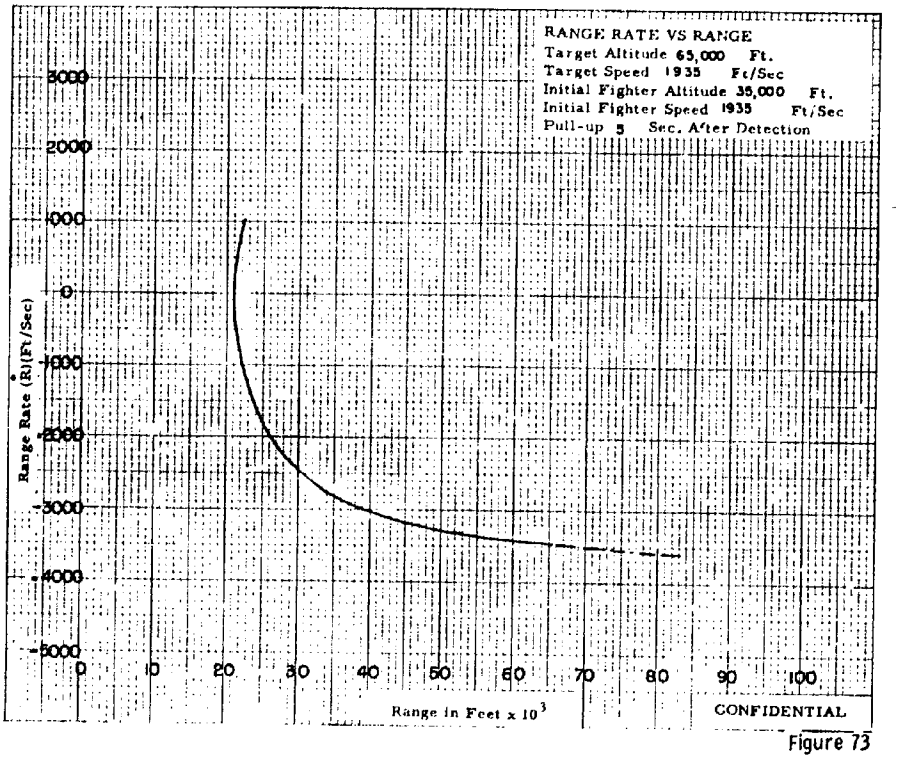
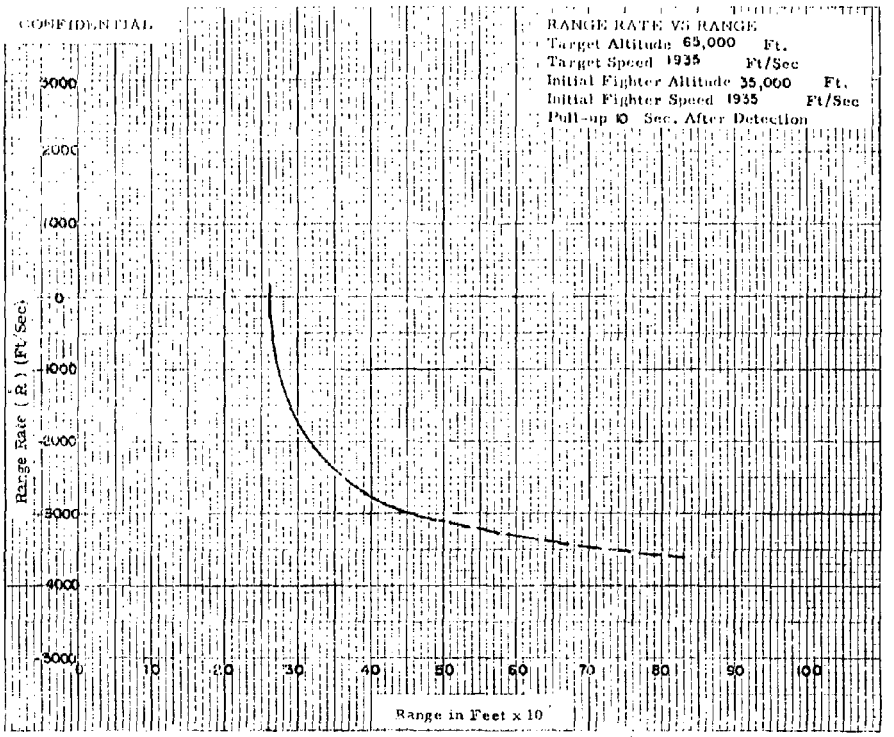

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 73


RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10

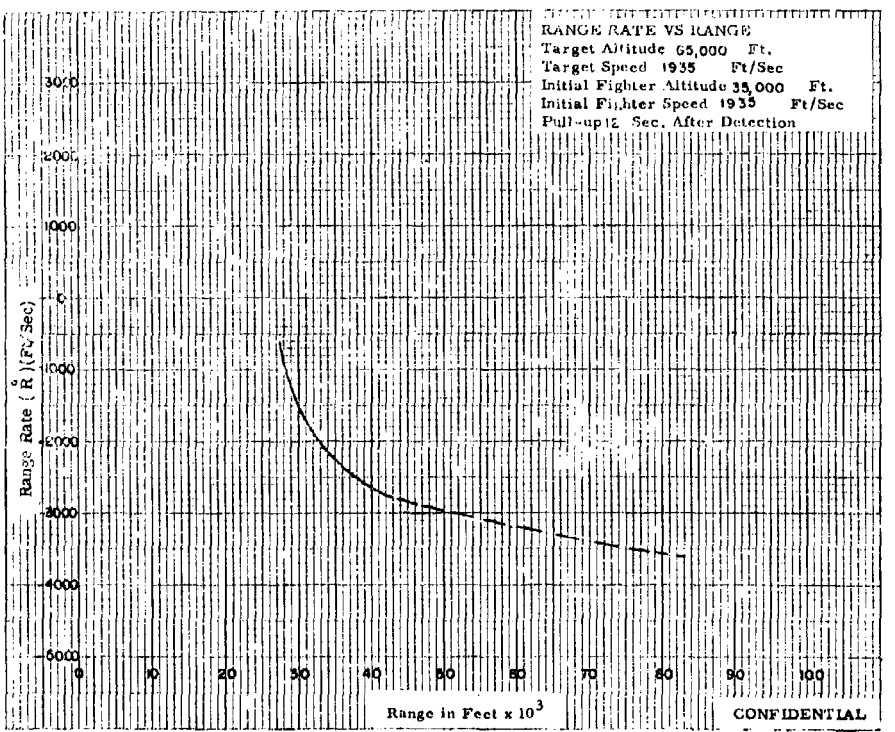

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 74

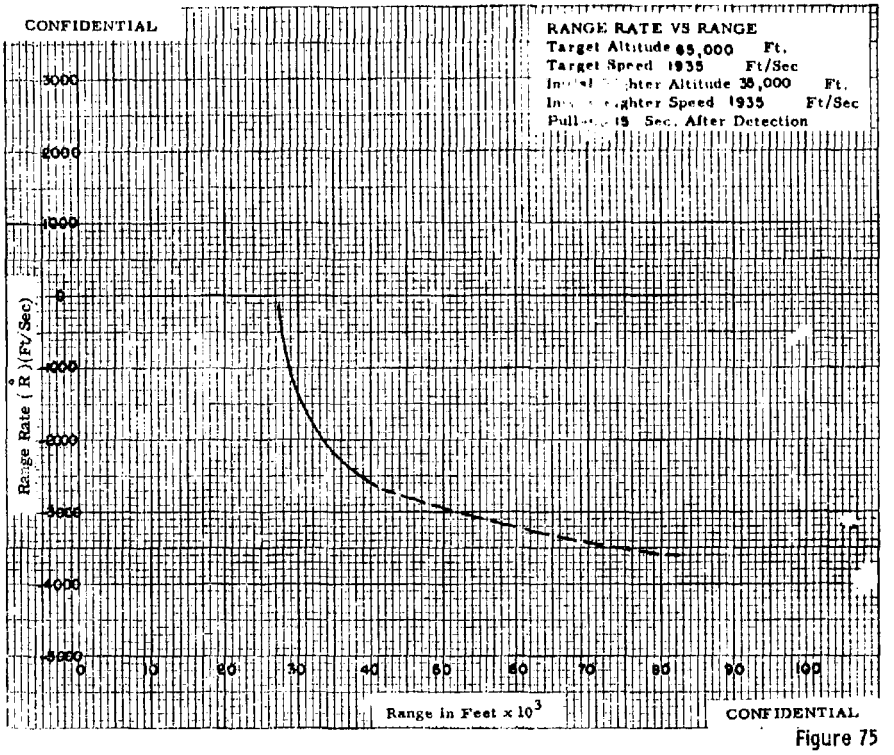


Figure 75

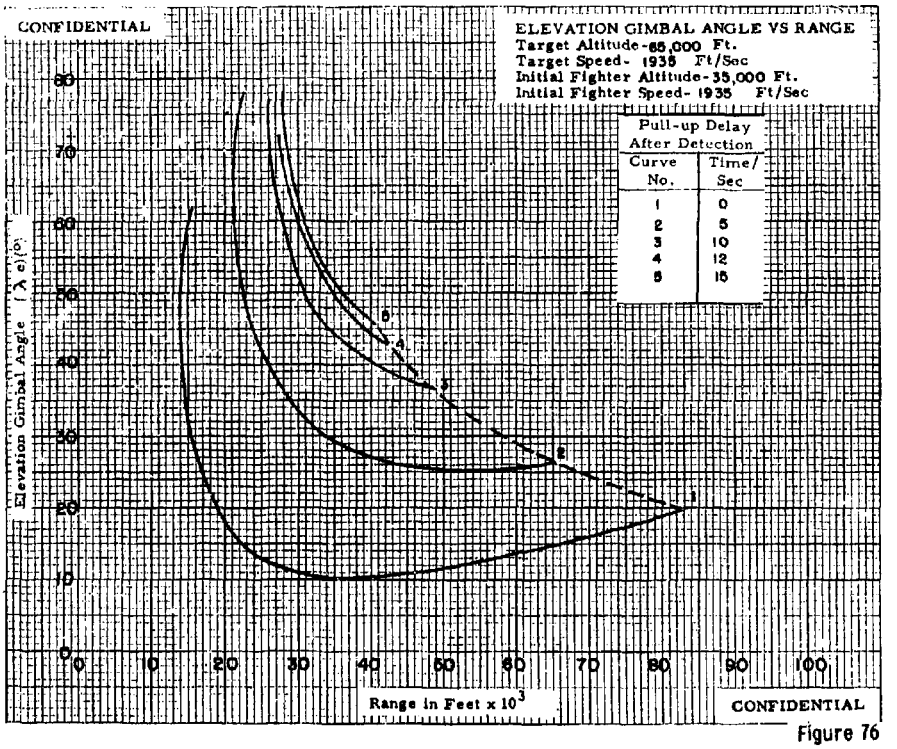


Figure 76

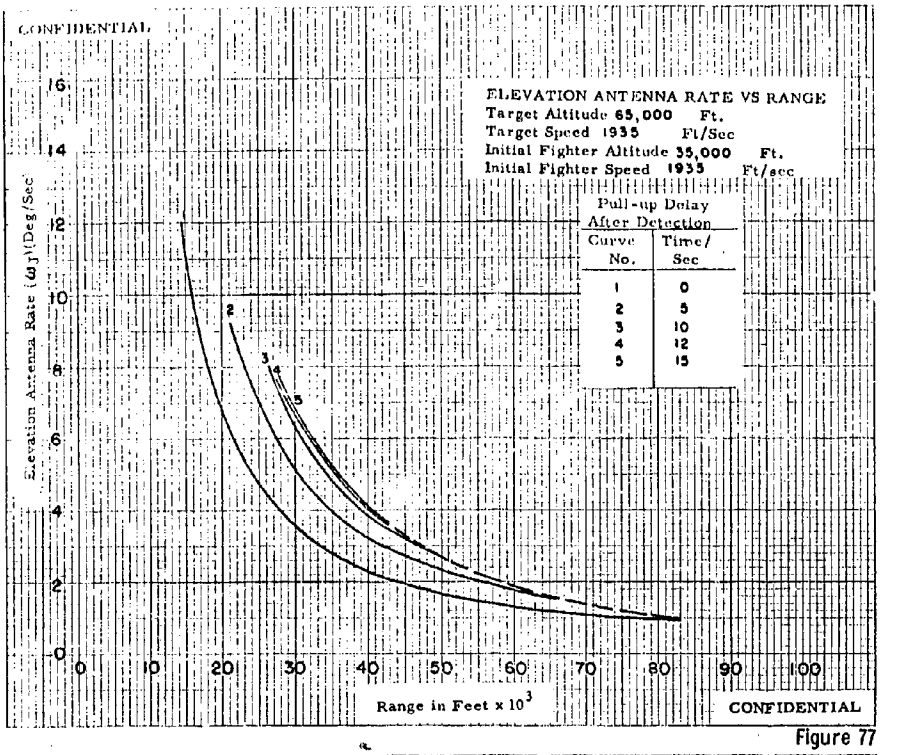


Figure 77

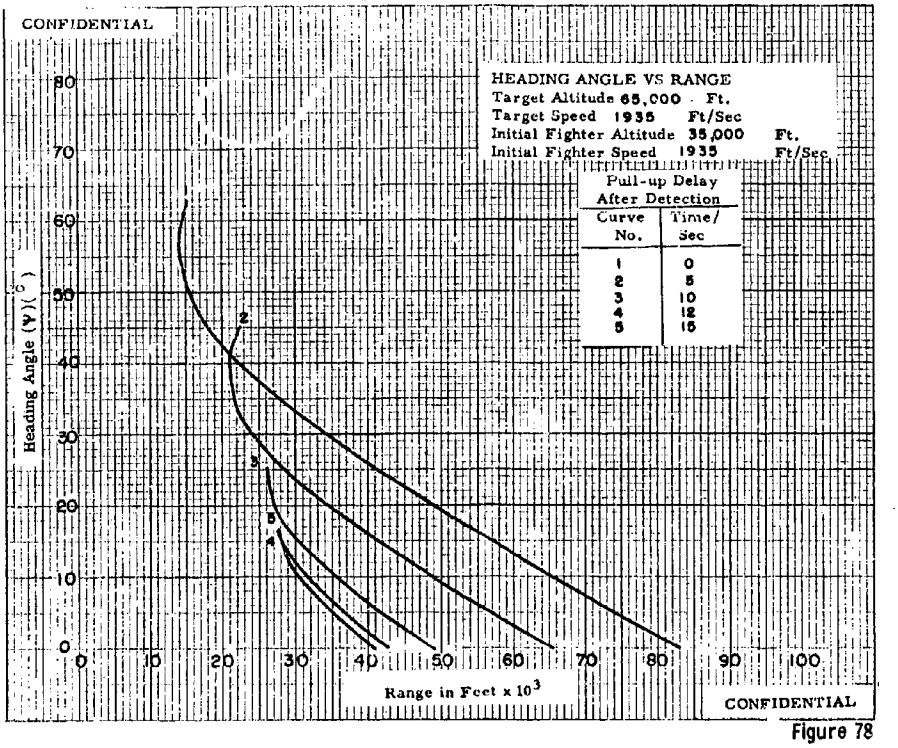
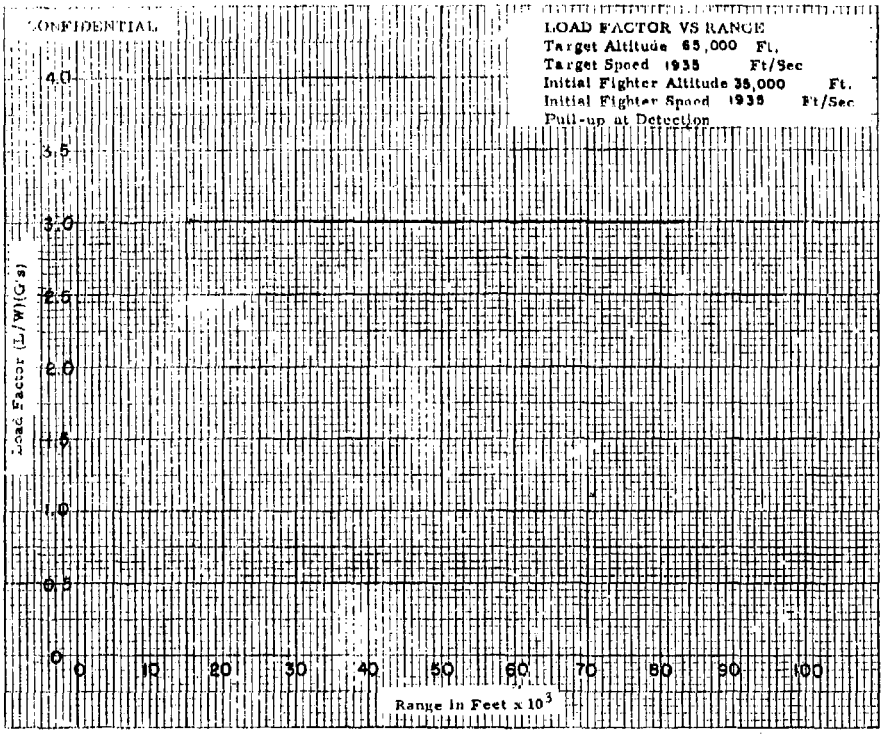


Figure 78


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

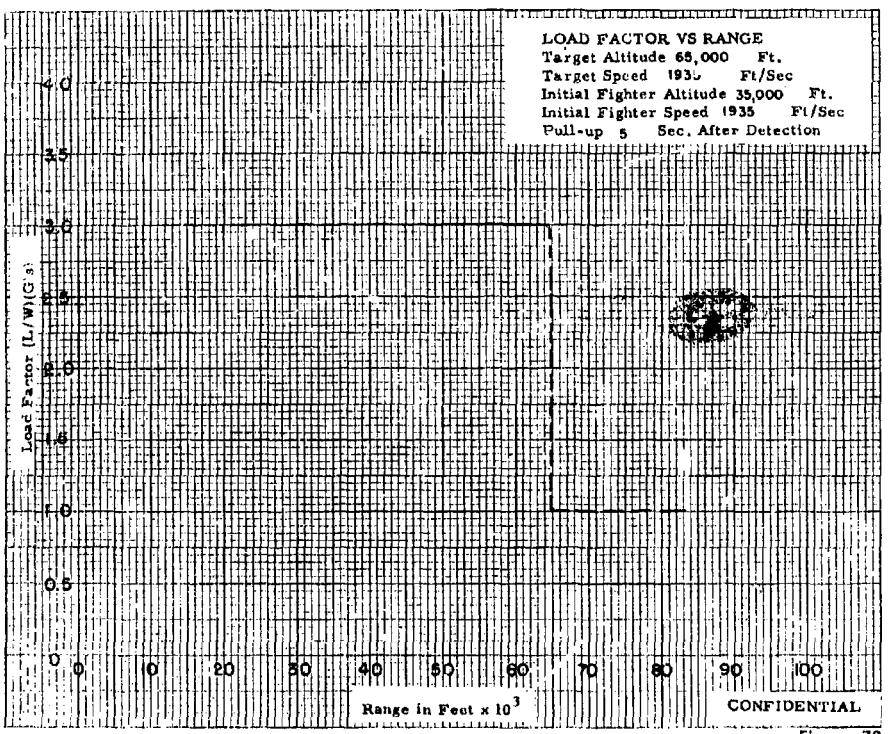
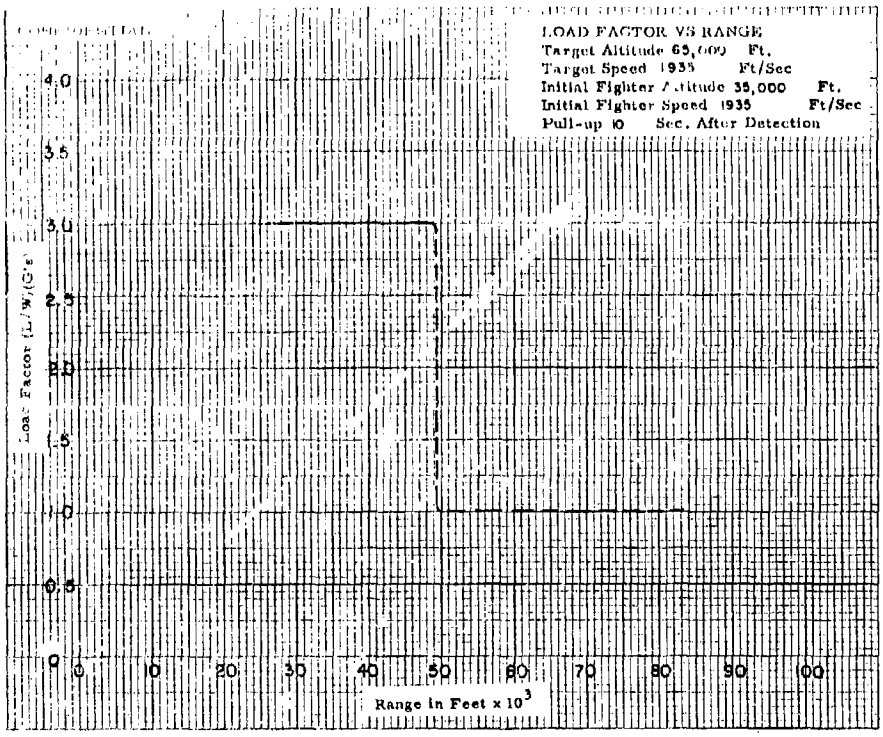

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 79


LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

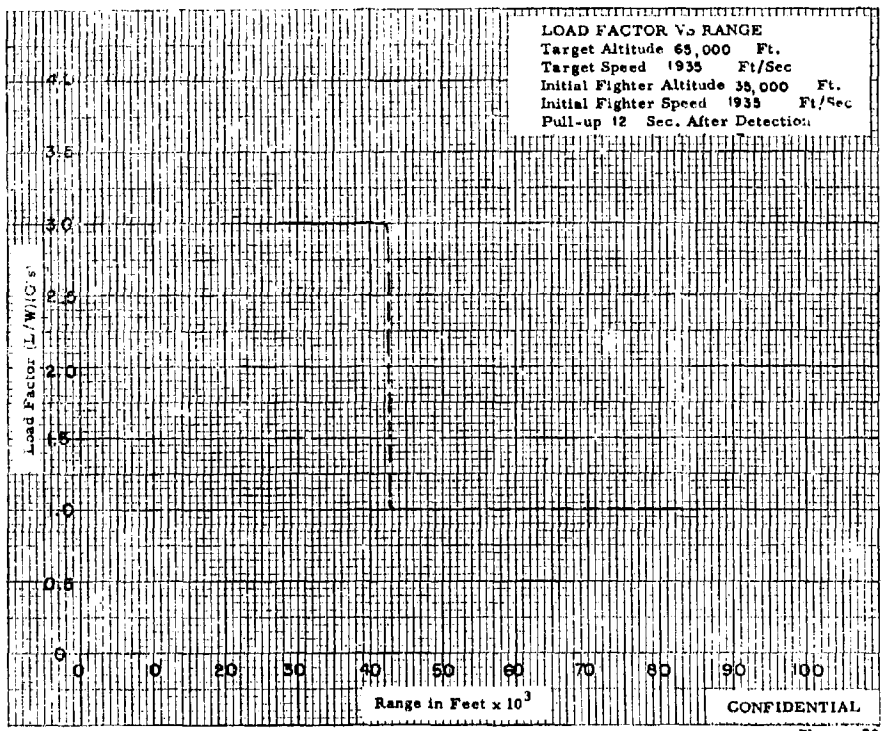

LOAD FACTOR Vs RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 80

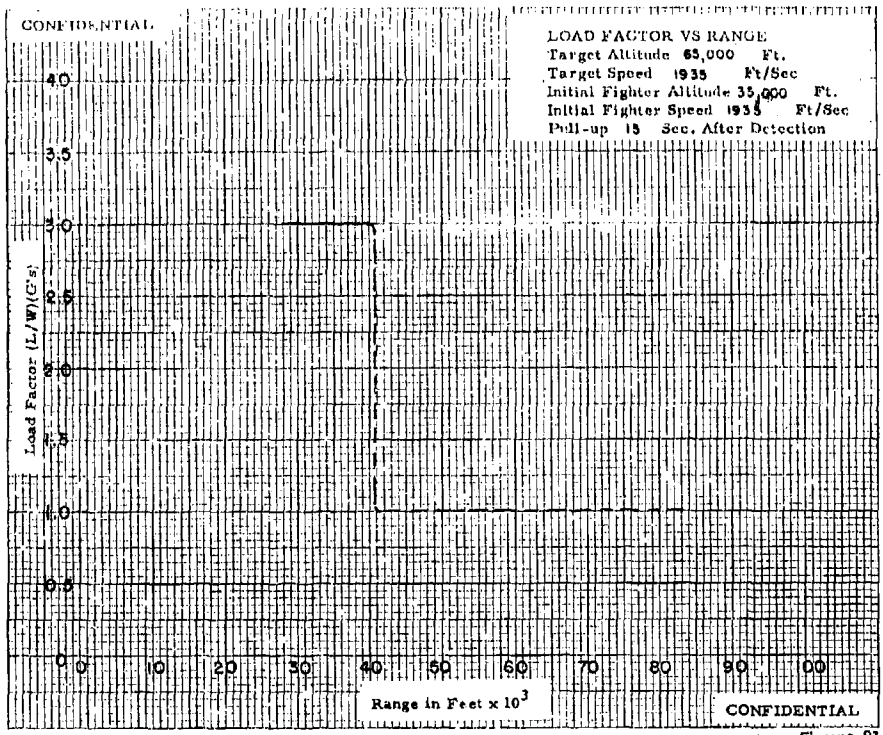


Figure 81

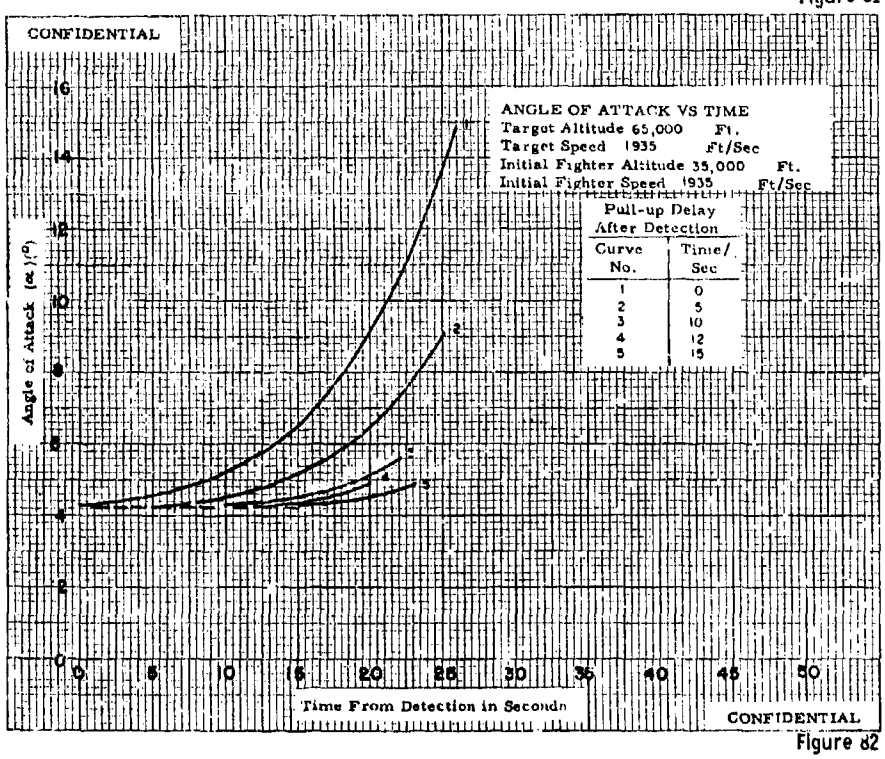


Figure 82

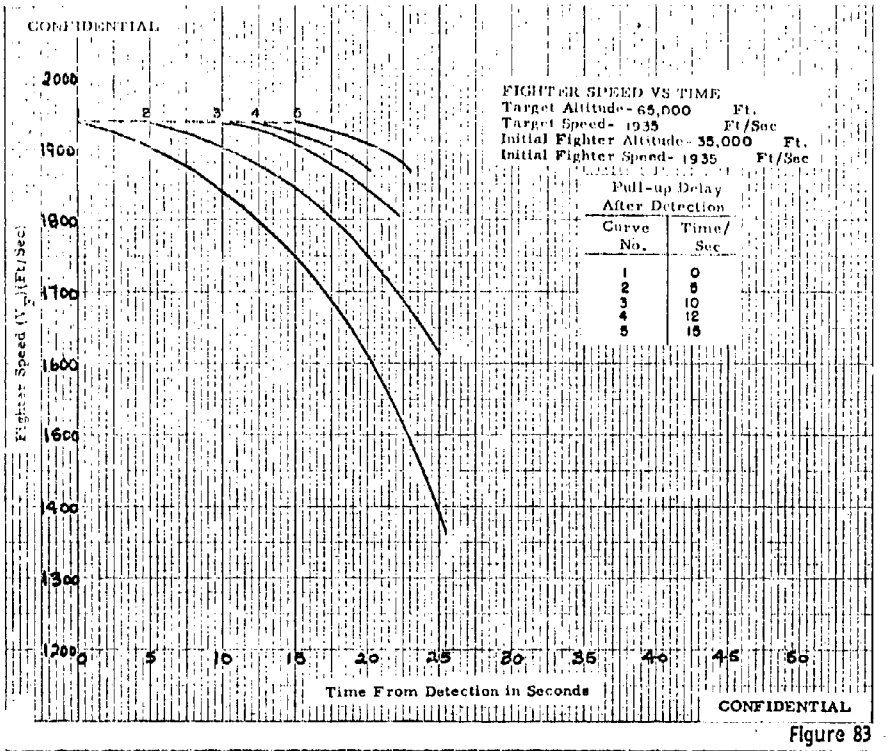


Figure 83

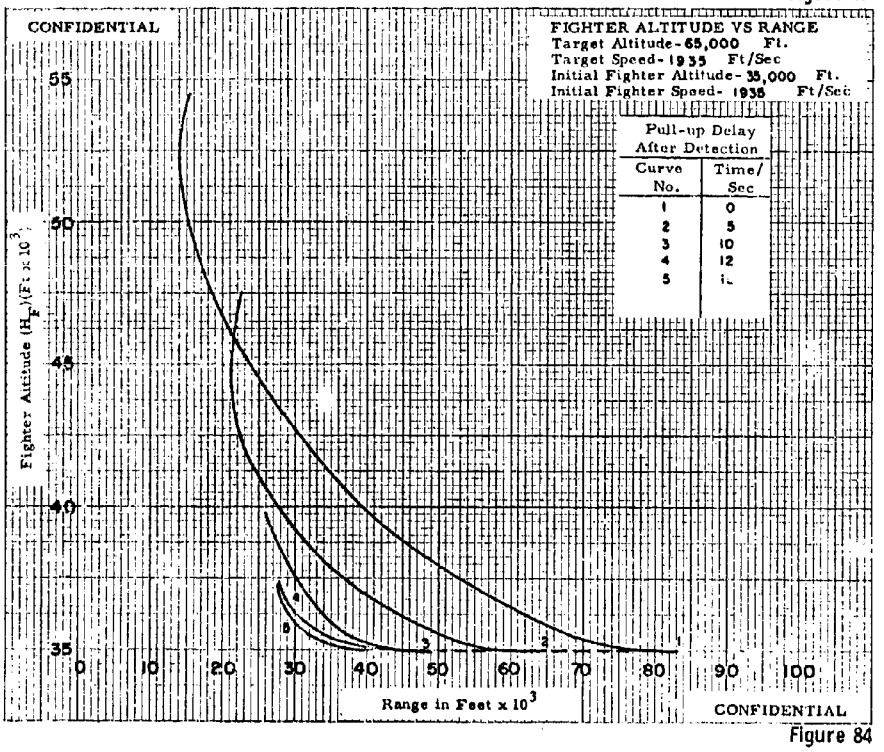
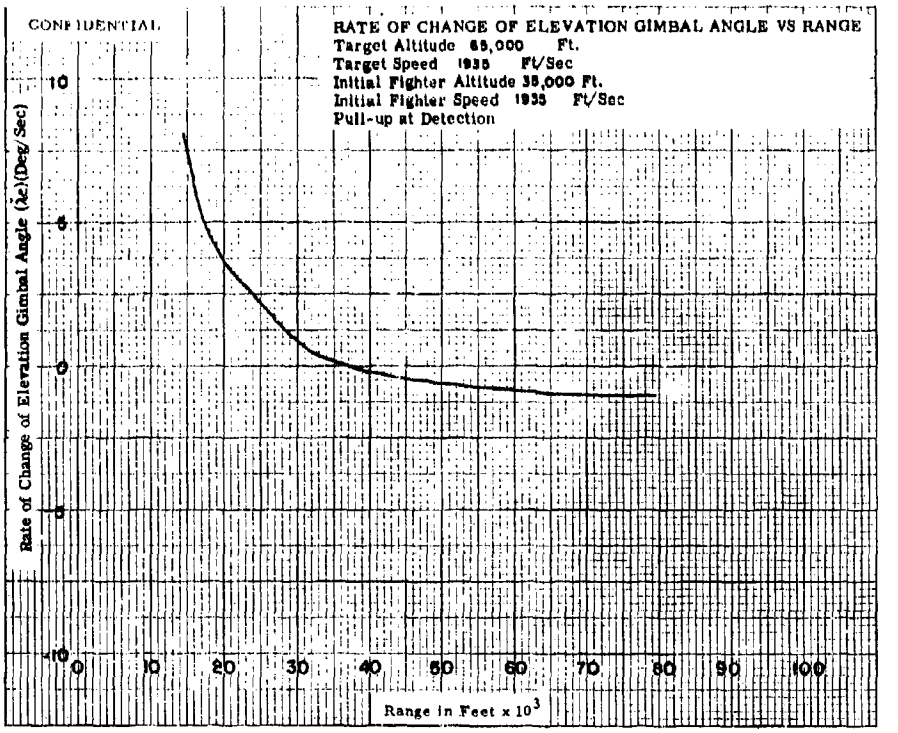


Figure 84


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

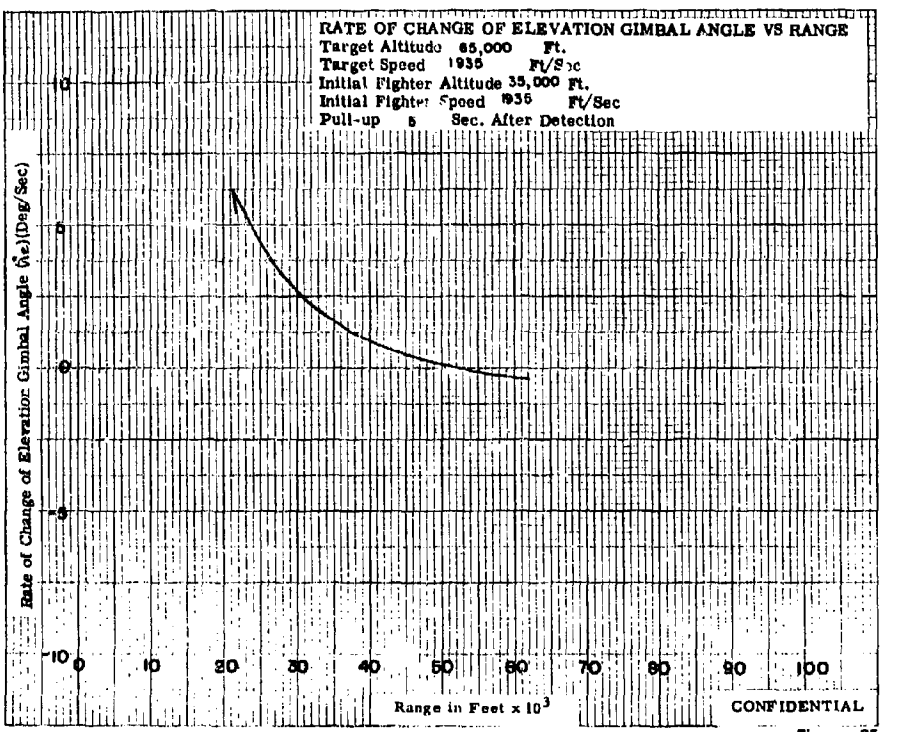
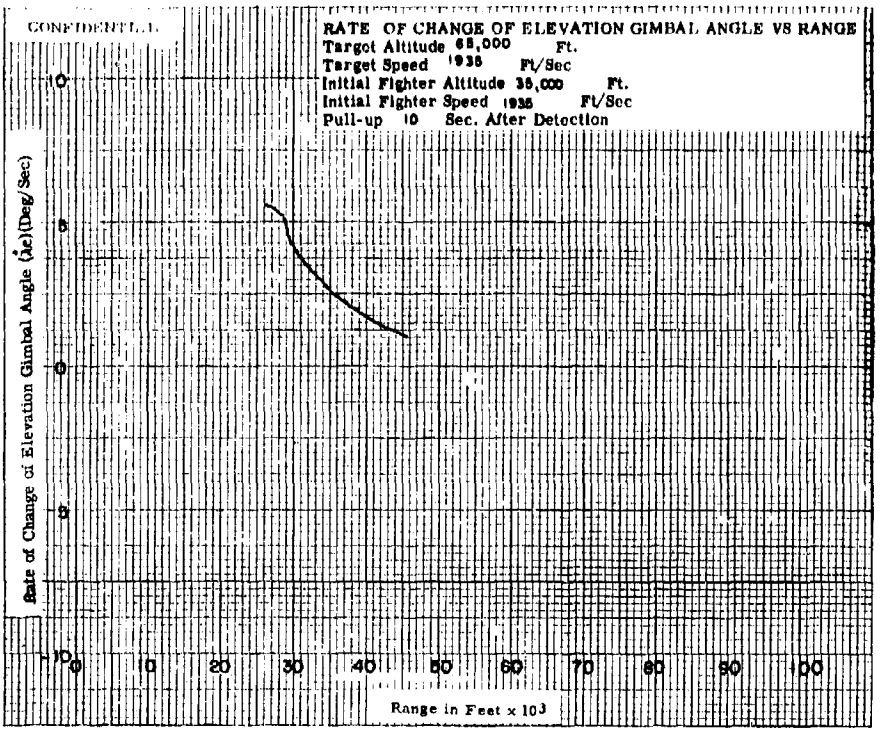

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 85


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

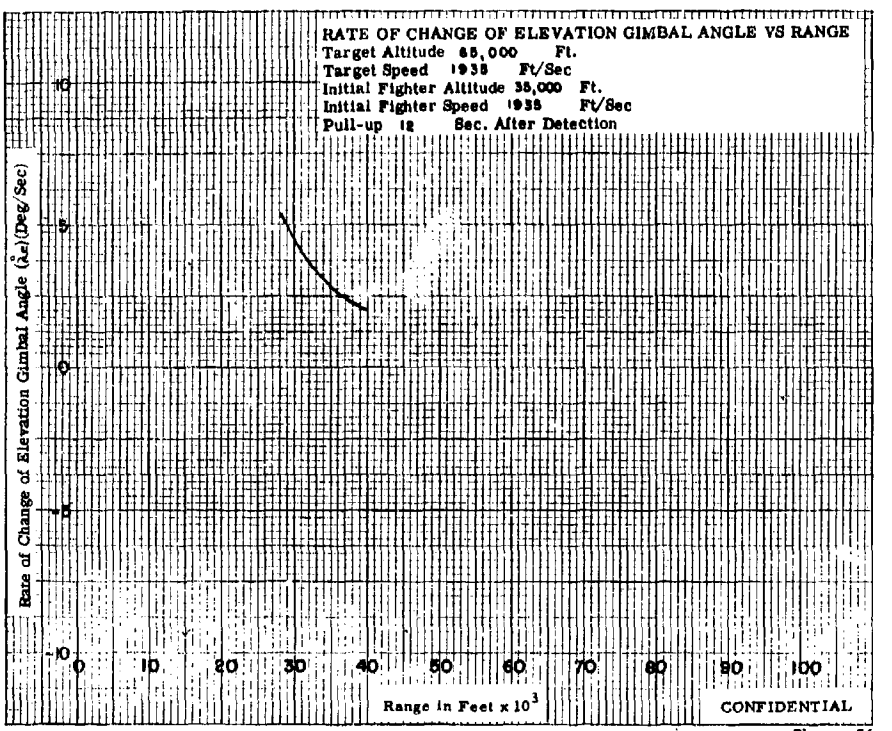

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 86

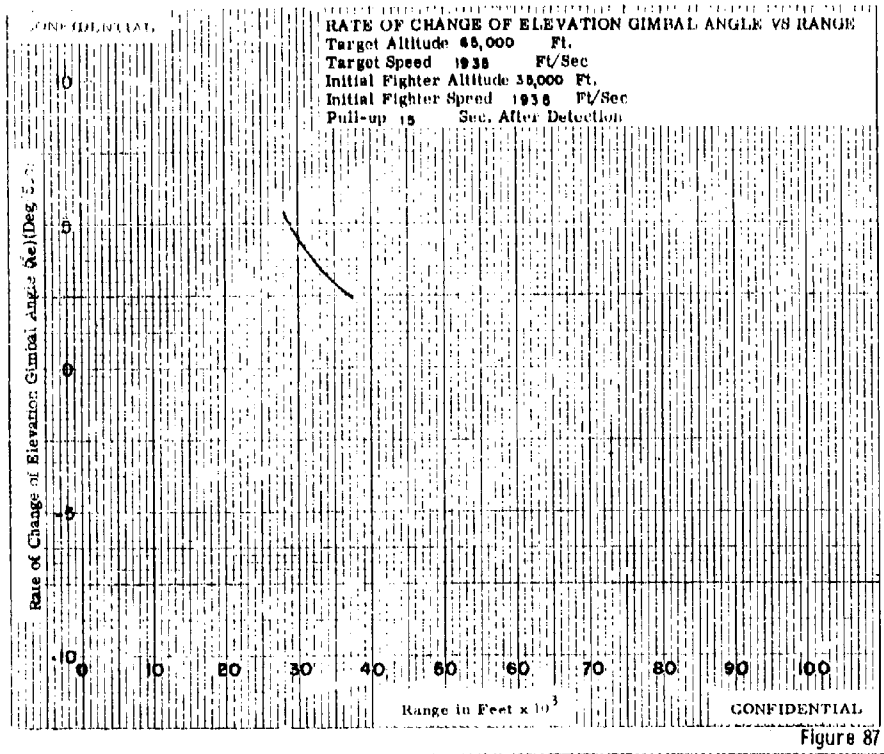


Figure 87

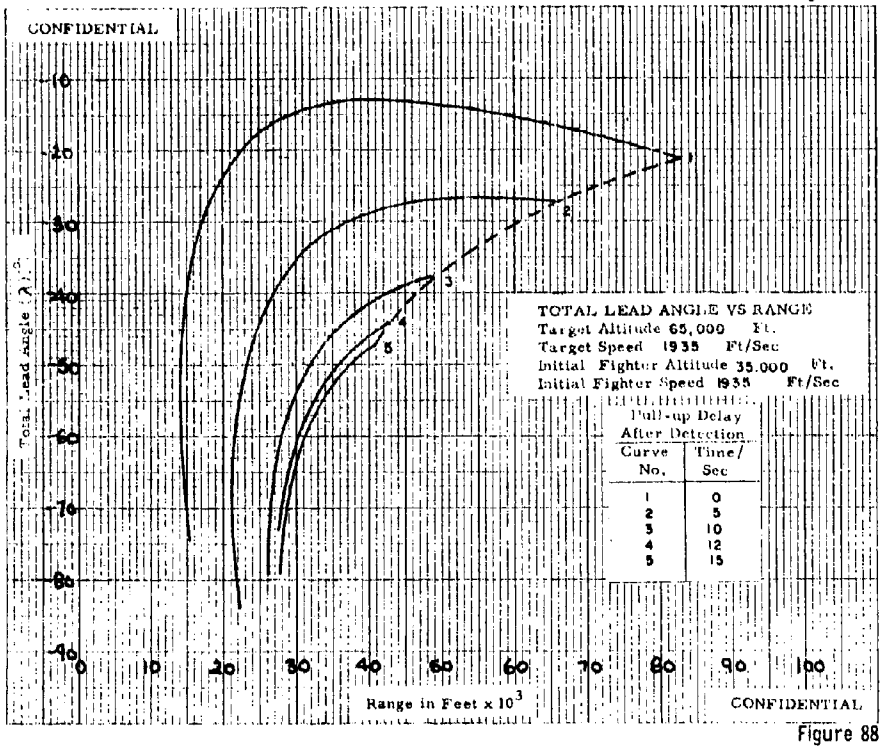
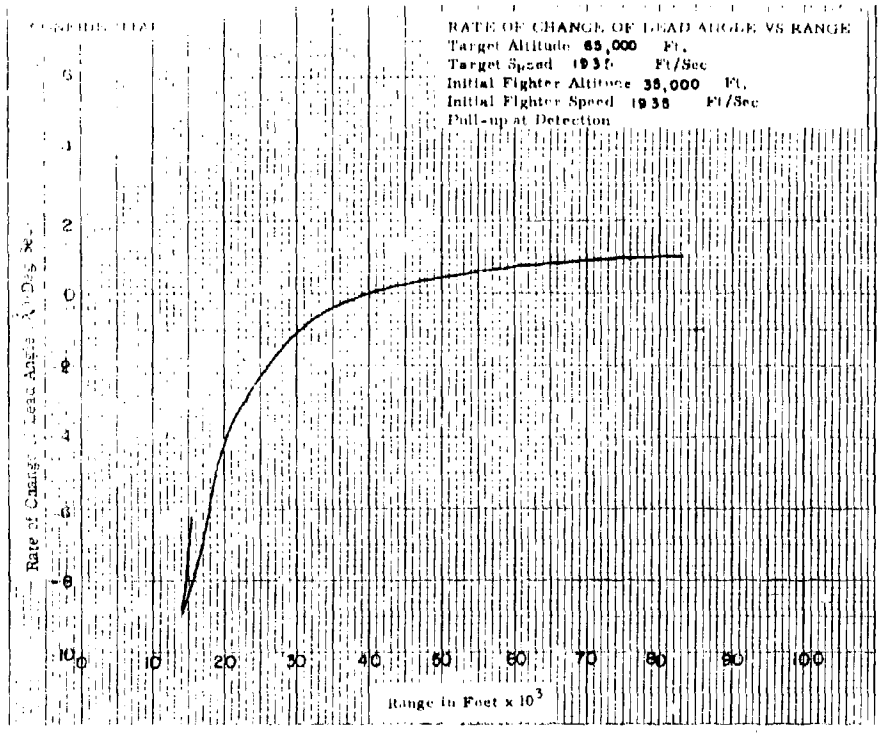


Figure 88


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (λ̇) (Deg Sec)
Range in Feet x 10^3

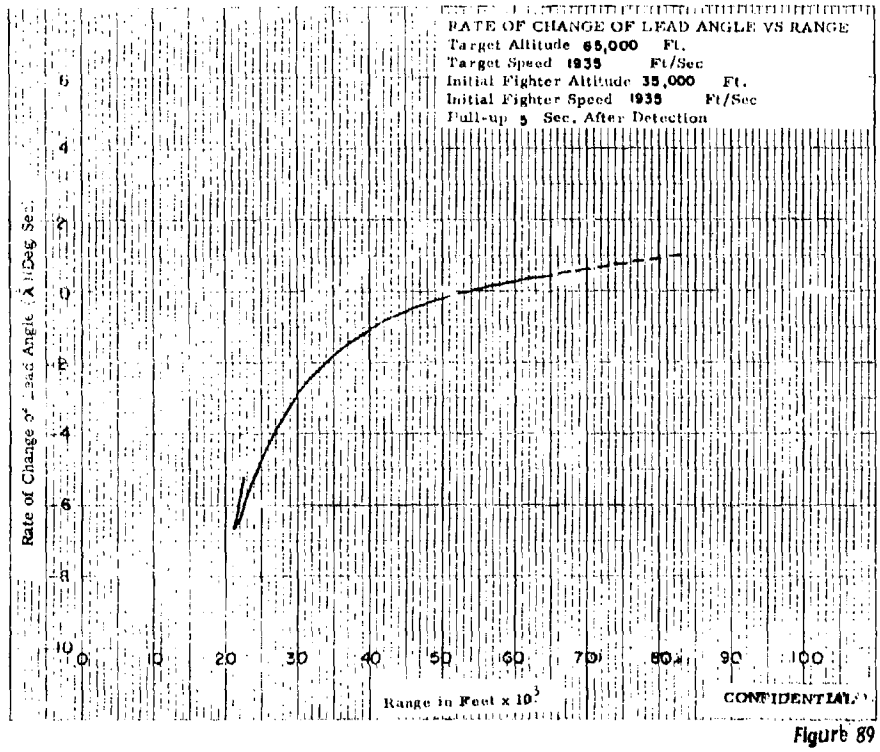
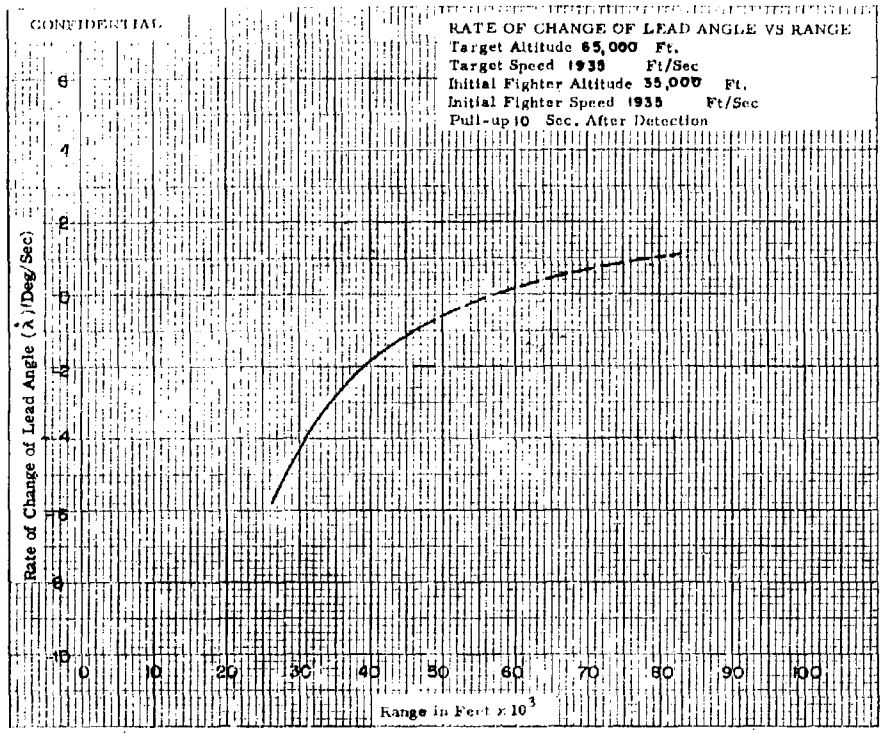

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 89


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle (λ̇) Deg/Sec
6
4
2
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

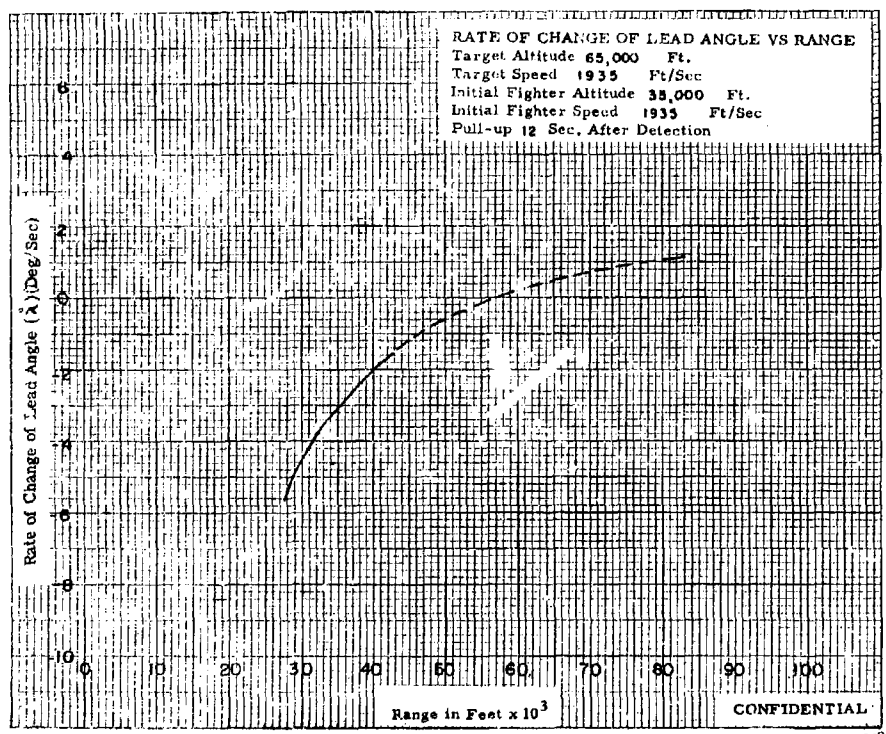
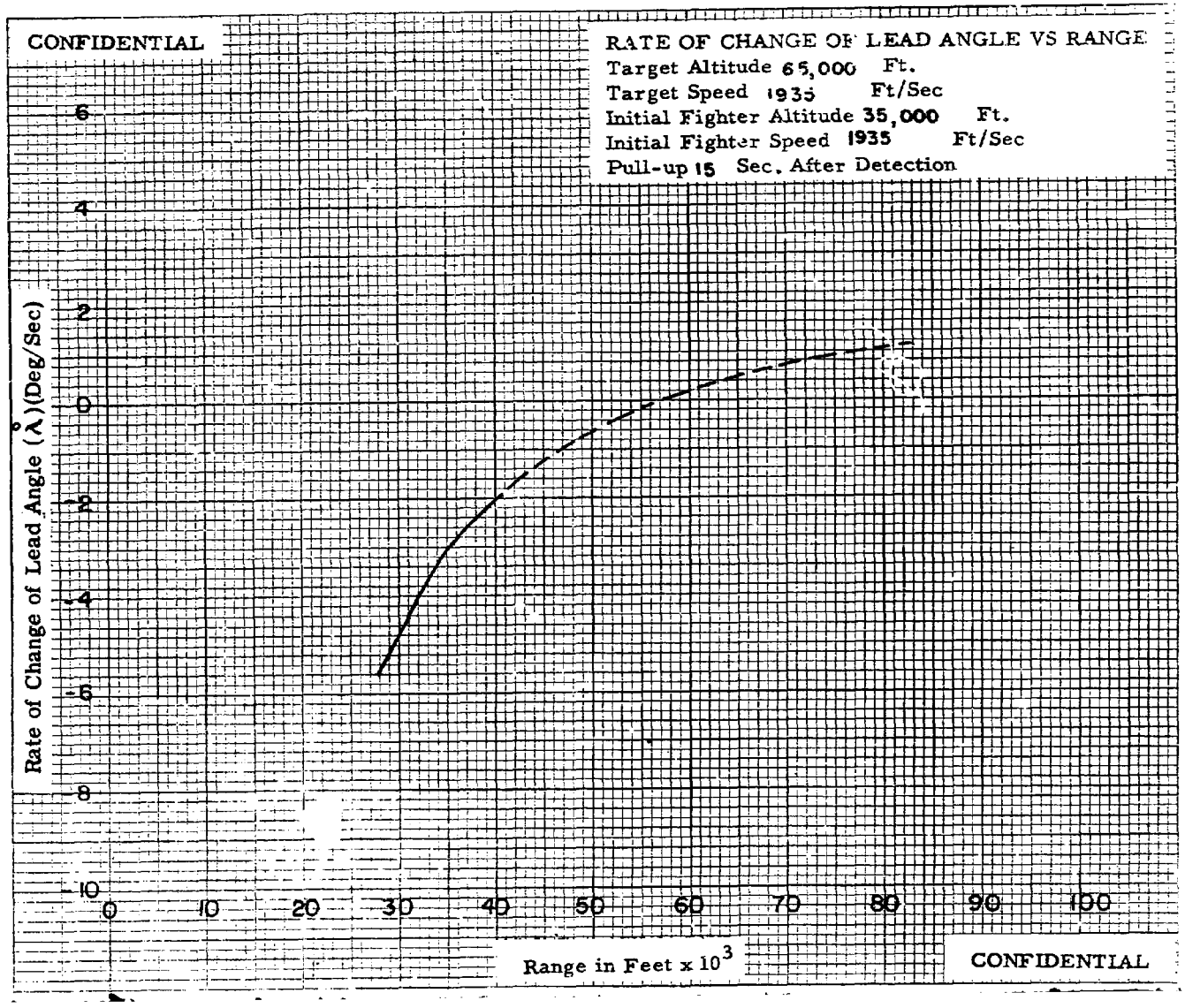
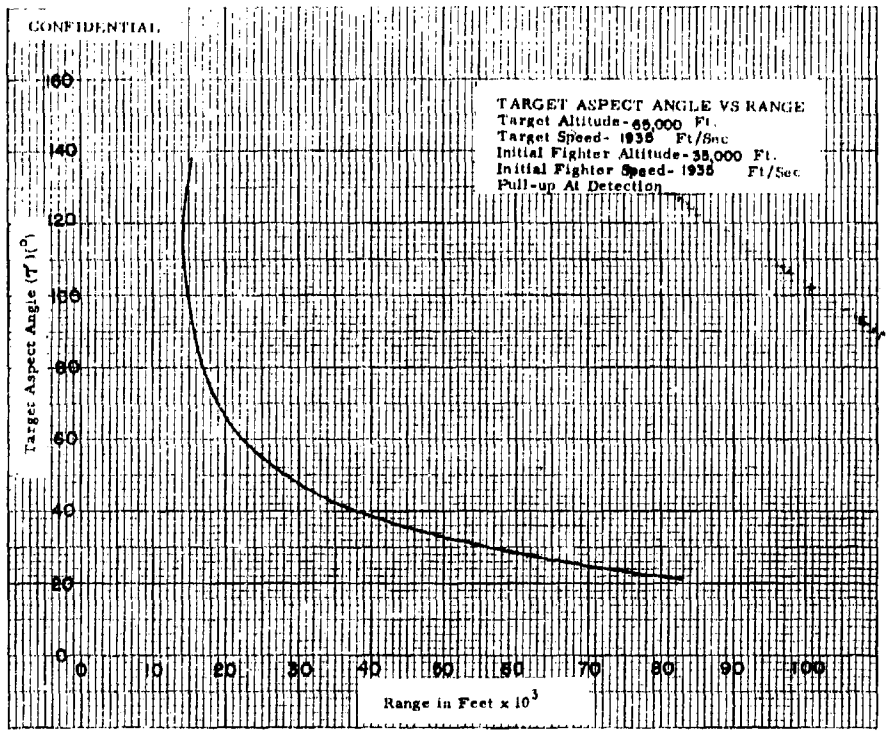

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 12 Sec. After Detection
Rate of Change of Lead Angle (λ̇) Deg/Sec
6
4
2
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 90

CONFIDENTIAL




CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude-35,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up At Detection
Target Aspect Angle (τ)(°)
Range in Feet x 10³
0
20
40
60
80
100
120
140
160
0
10
20
30
40
50
60
70
80
90
100

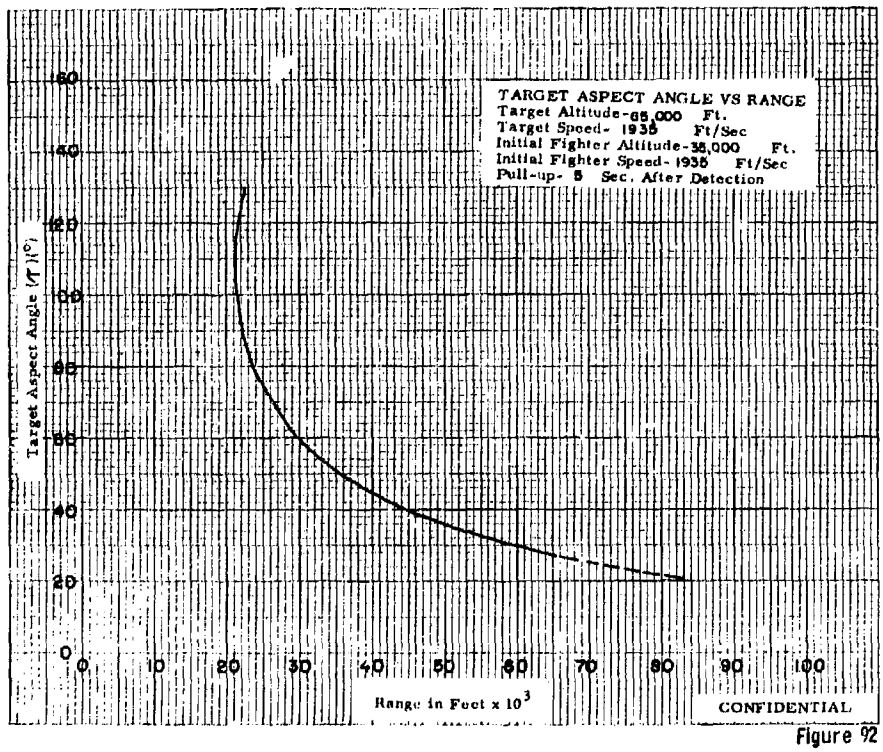
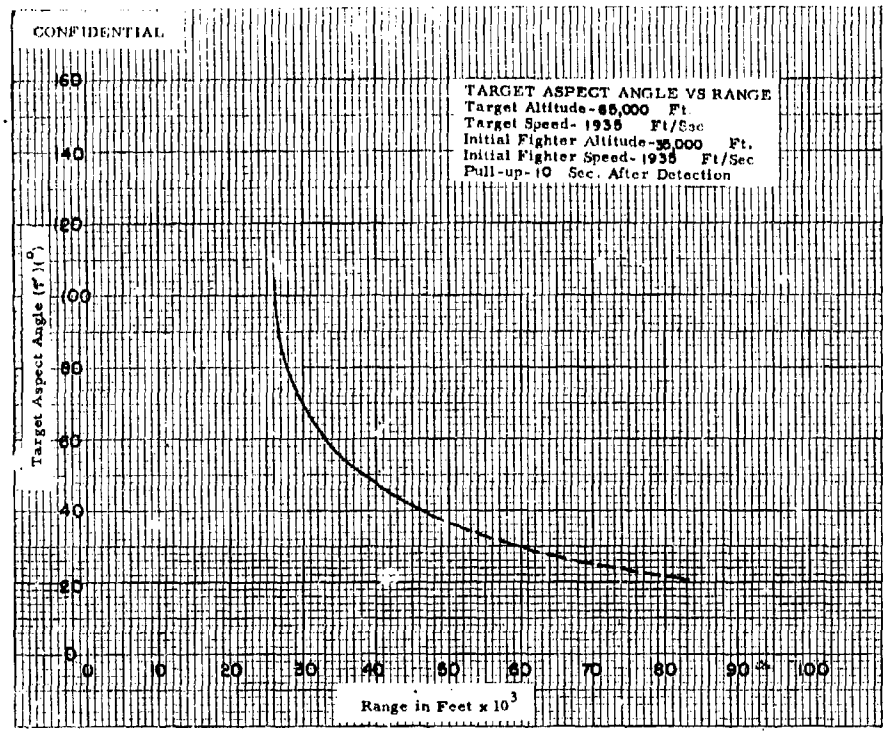

TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude-35,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up- 5 Sec. After Detection
Target Aspect Angle (τ)(°)
Range in Feet x 10³
0
20
40
60
80
100
120
140
160
0
10
20
30
40
50
60
70
80
90
100
CONFIDENTIAL

Figure 92


TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude-35,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up- 10 Sec. After Detection
Target Aspect Angle (T)(°)
Range in Feet x 10³
0
10
20
30
40
50
60
70
80
90
100
120
140
160

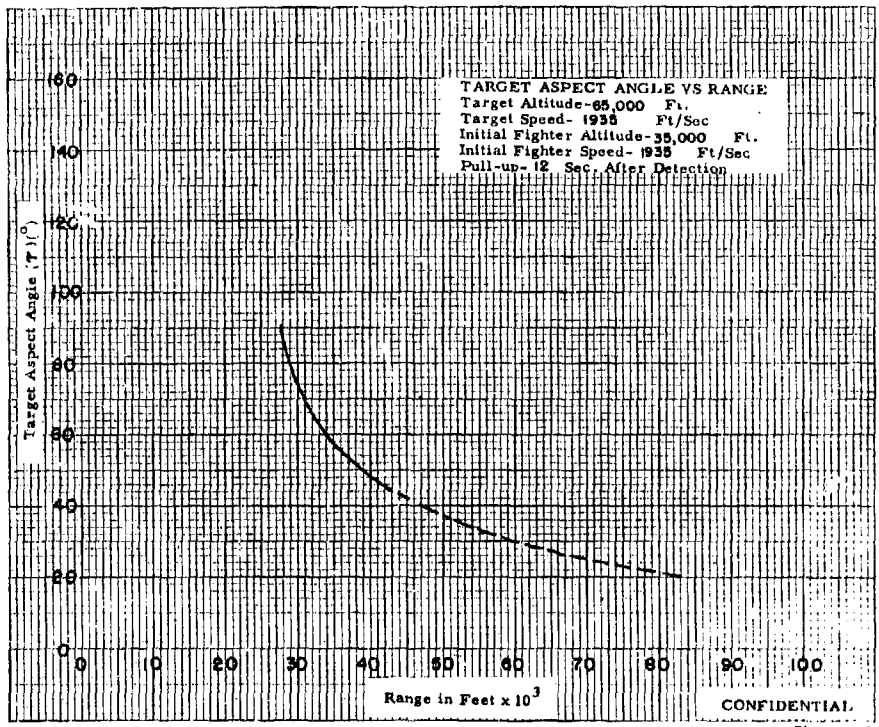

TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude-35,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up- 12 Sec. After Detection
Target Aspect Angle (T)(°)
Range in Feet x 10³
0
10
20
30
40
50
60
70
80
90
100
120
140
160

Figure 93

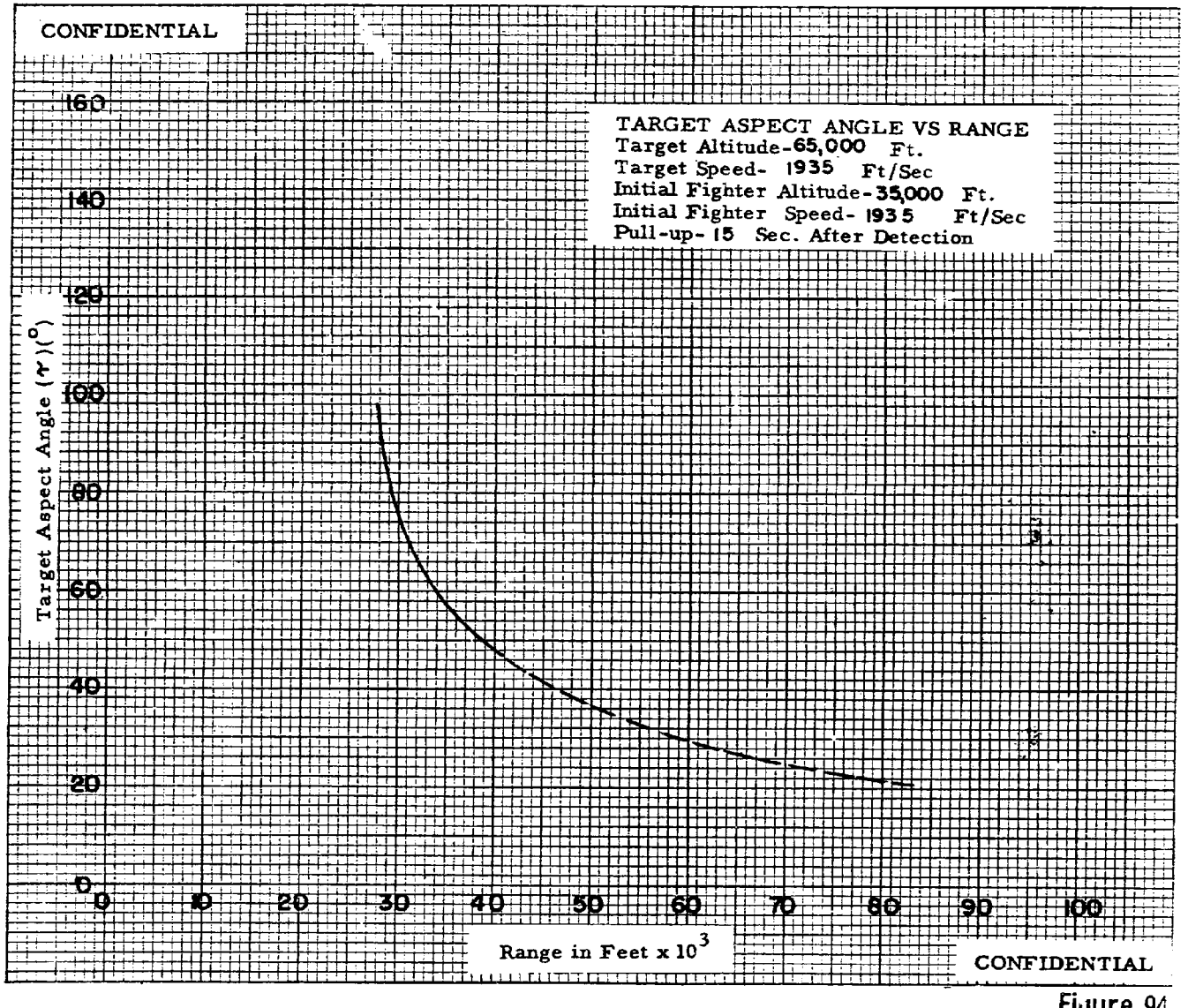
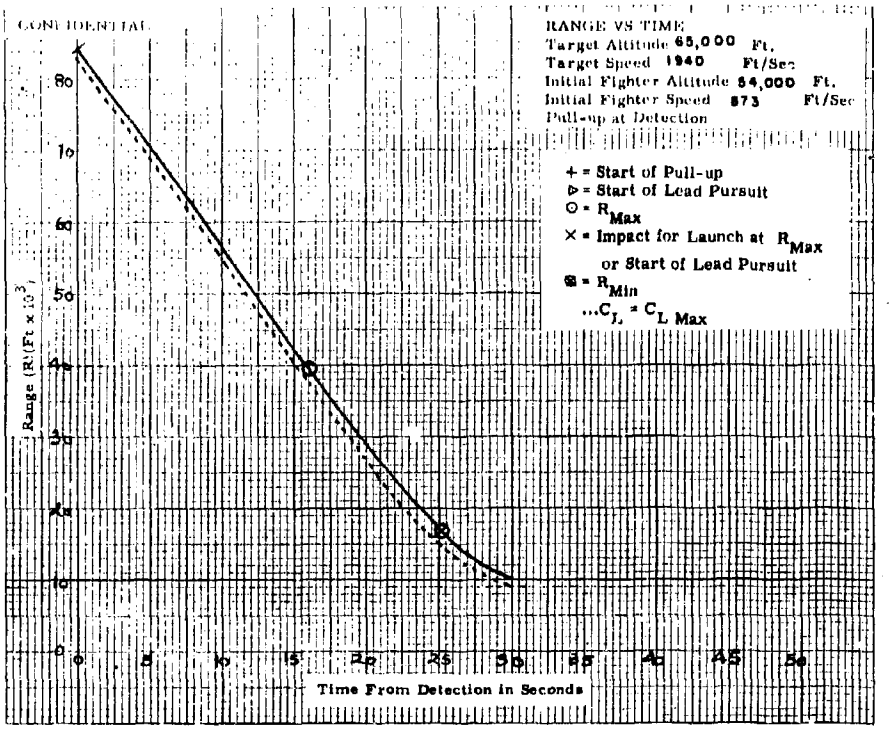

CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude-35,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up- 15 Sec. After Detection
Target Aspect Angle (ϒ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 94


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊠ = R Min
...C_L = C_L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds

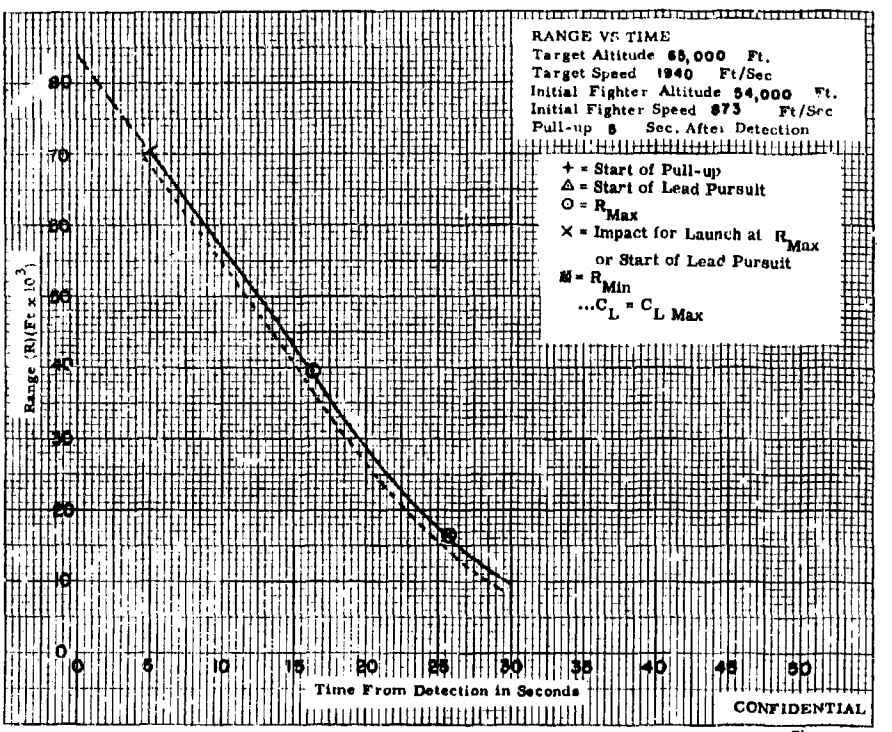
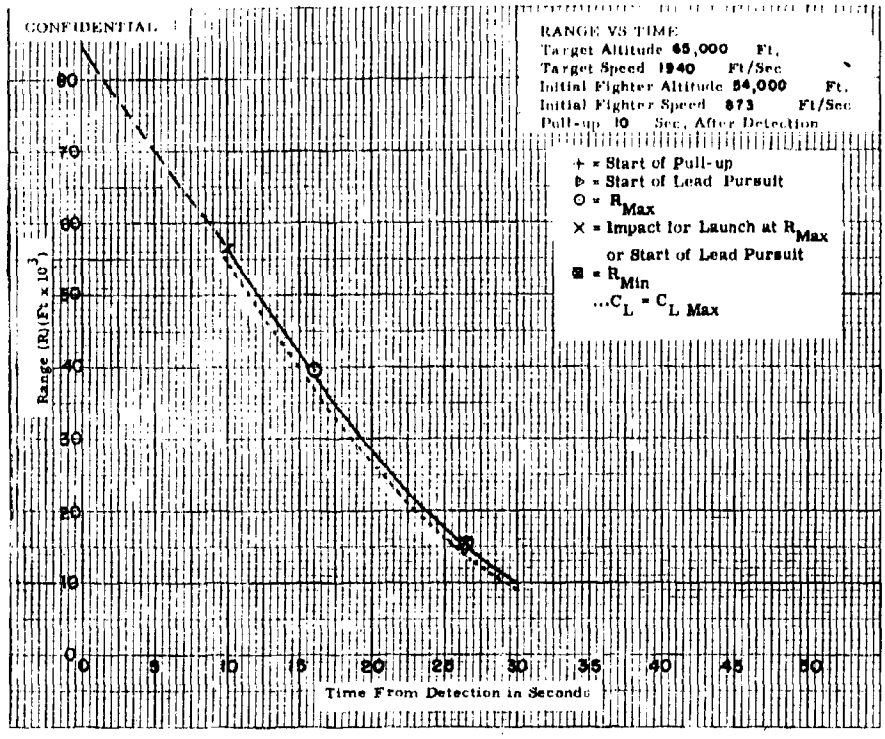

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 5 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
O = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊠ = R Min
...C_L = C_L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 95


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
▣ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

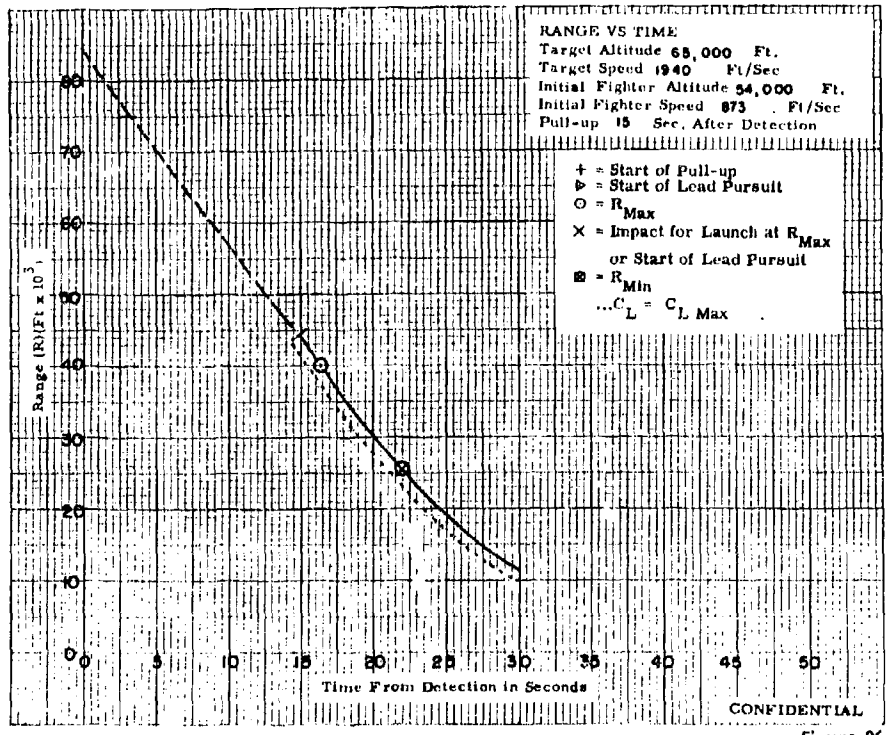
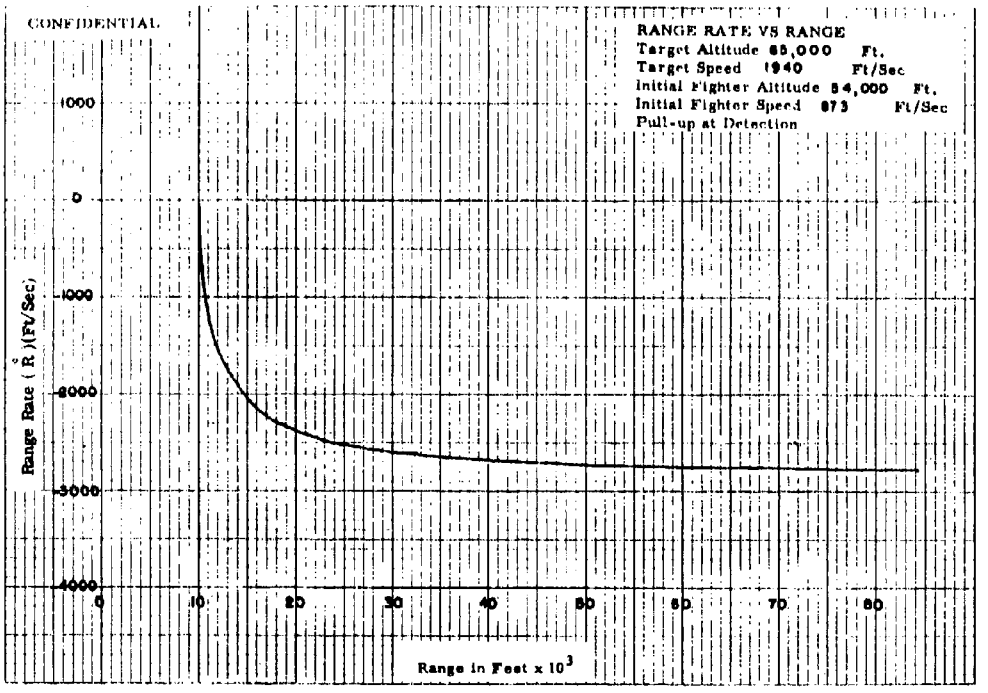

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
▣ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 96


RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

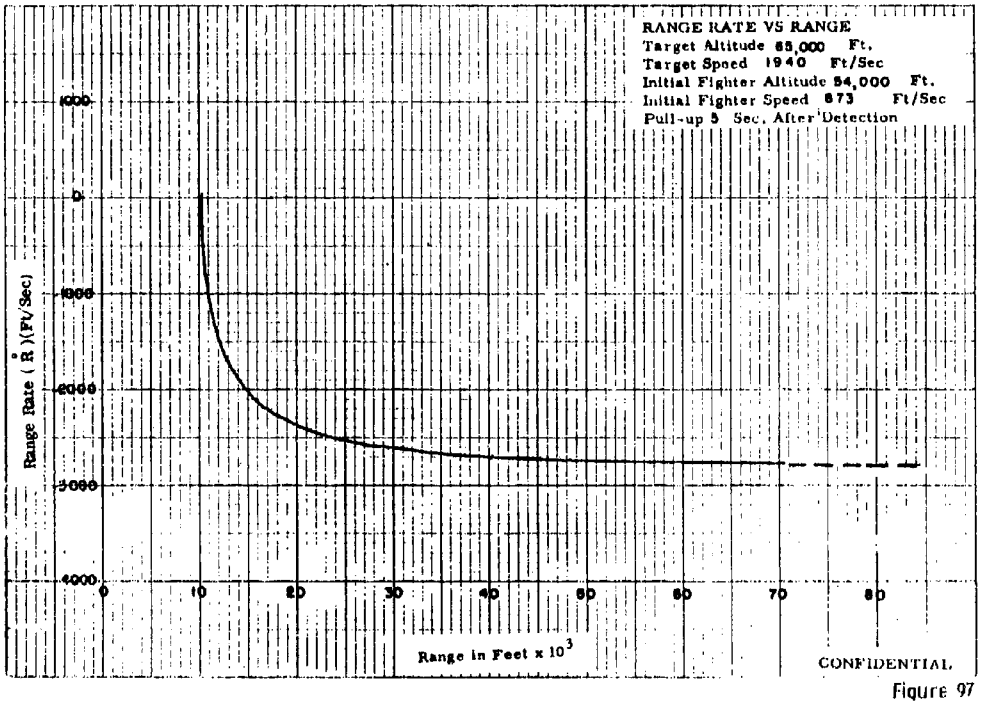
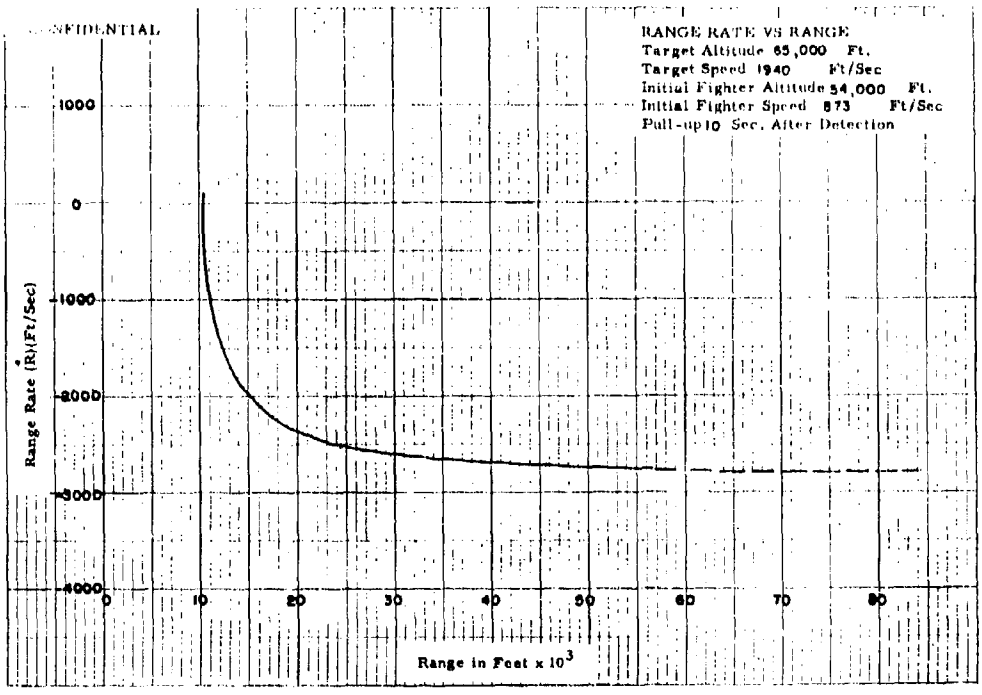

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 5 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

Figure 97


RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

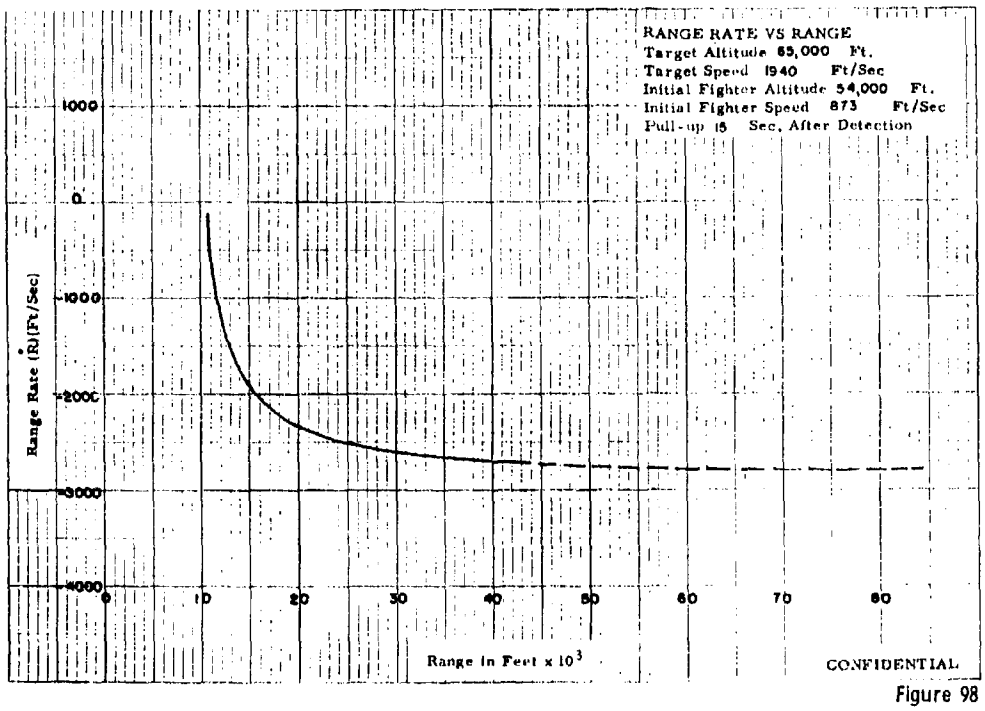
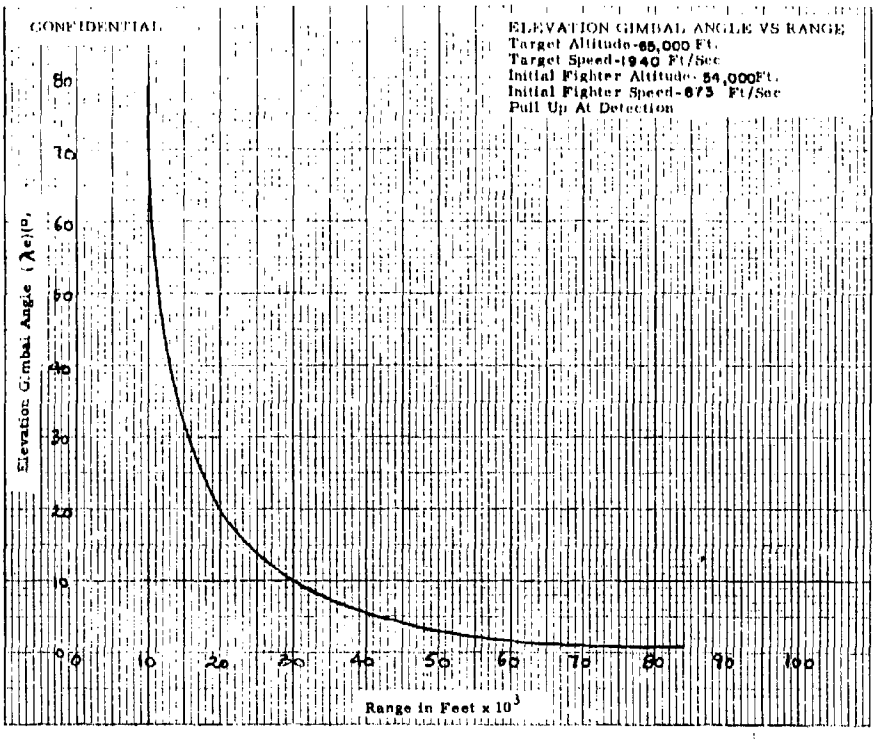
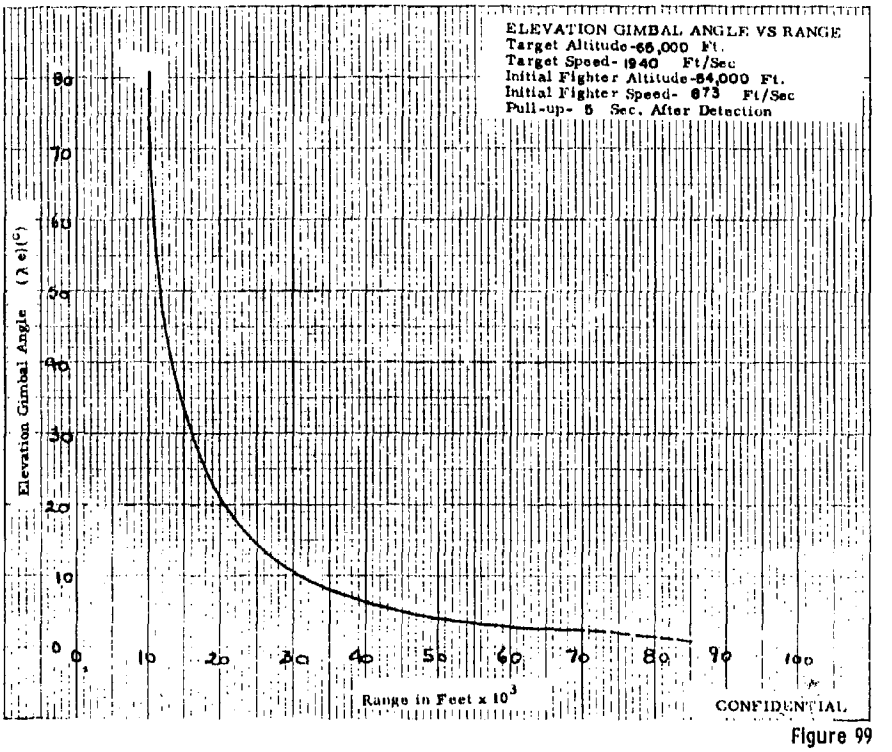

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 98

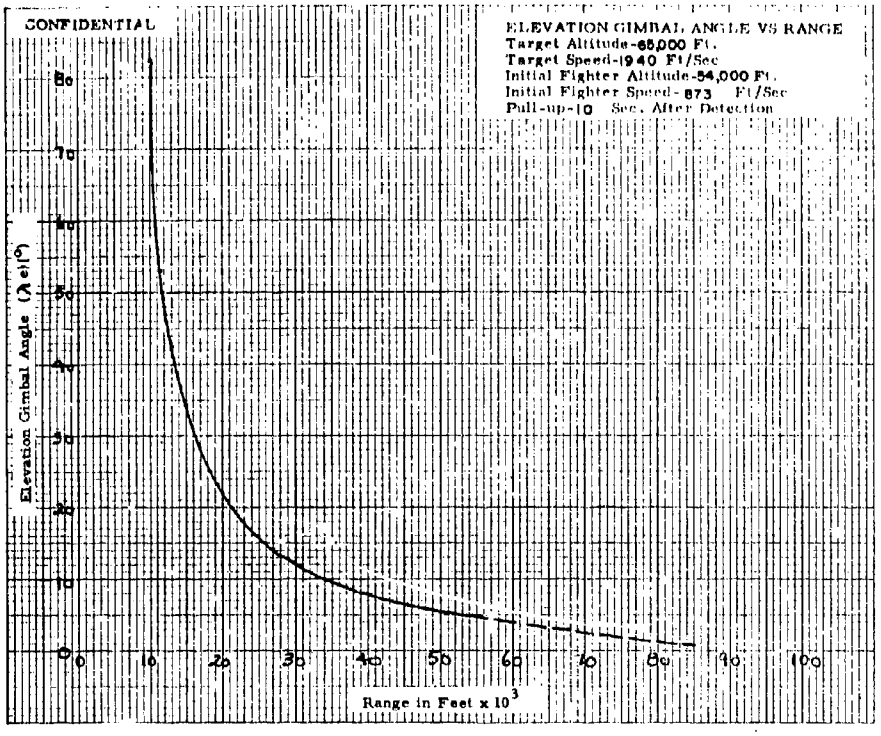
CONFIDENTIAL





CONFIDENTIAL

Figure 99


CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-54,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up-10 Sec. After Detection
Elevation Gimbal Angle (λe)(°)
Range in Feet x 10³

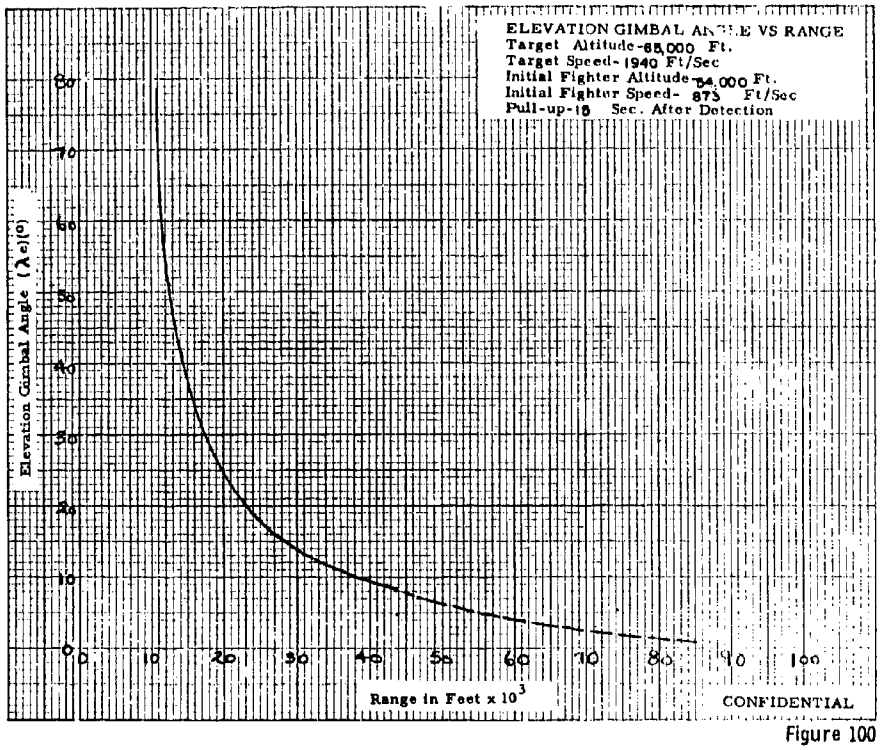
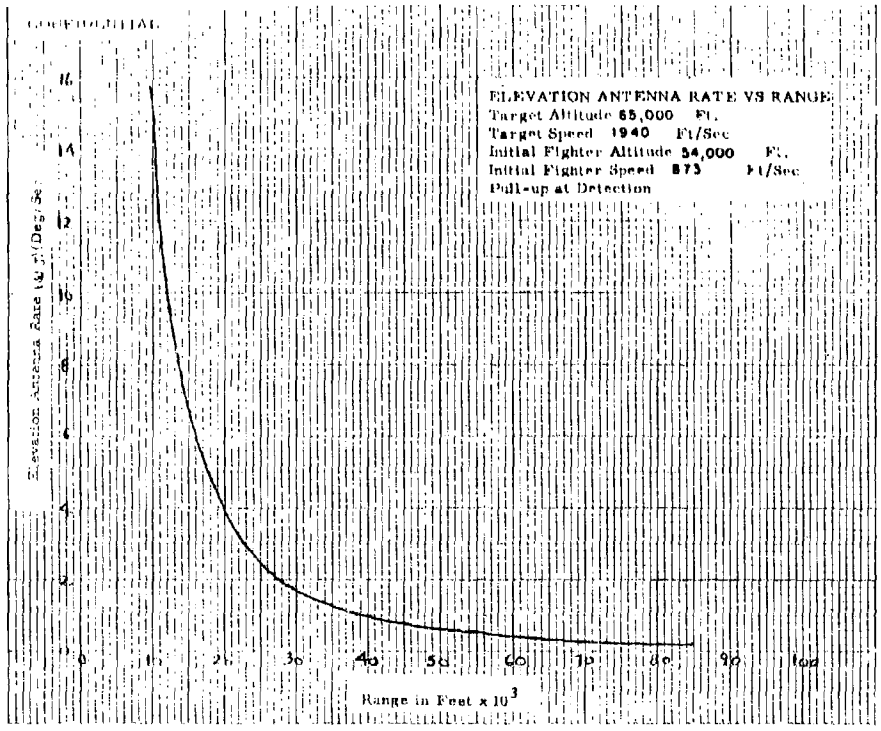

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-54,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up-10 Sec. After Detection
Elevation Gimbal Angle (λe)(°)
Range in Feet x 10³
CONFIDENTIAL

Figure 100


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Elevation Antenna Rate (ω) (Deg/Sec)
Range in Feet x 10^3

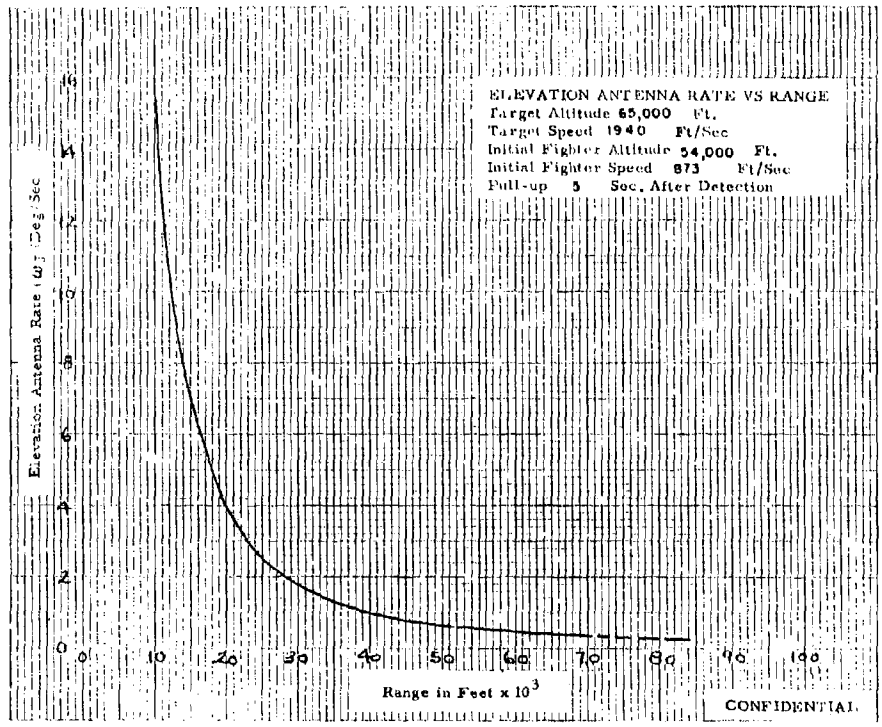
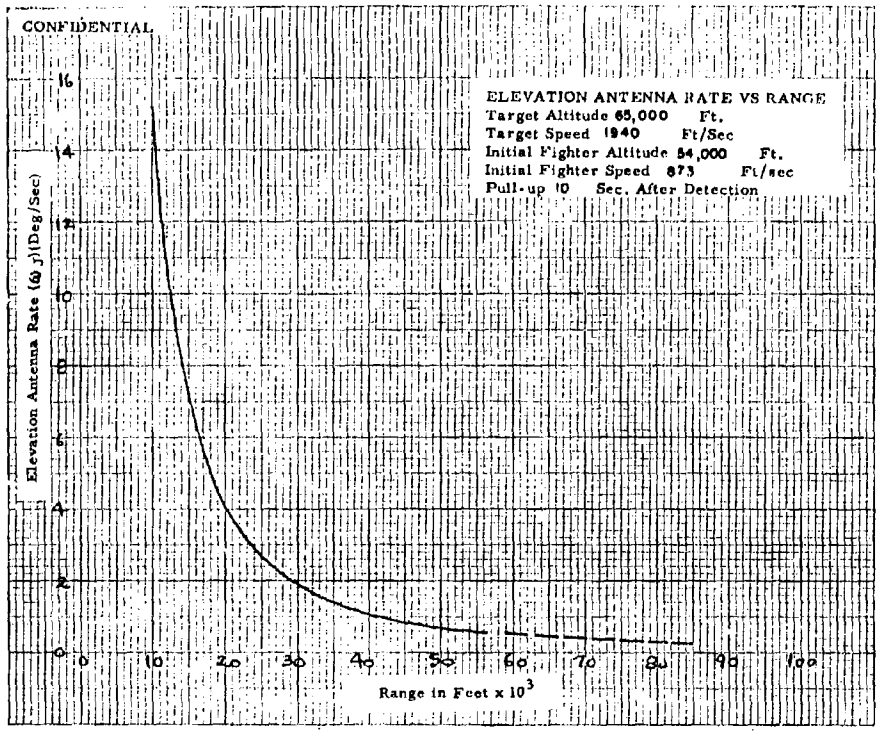

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 5 Sec. After Detection
Elevation Antenna Rate (ω) (Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 101


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/sec
Pull-up 10 Sec. After Detection
Elevation Antenna Rate (ω_E)(Deg/Sec)
Range in Feet x 10^3

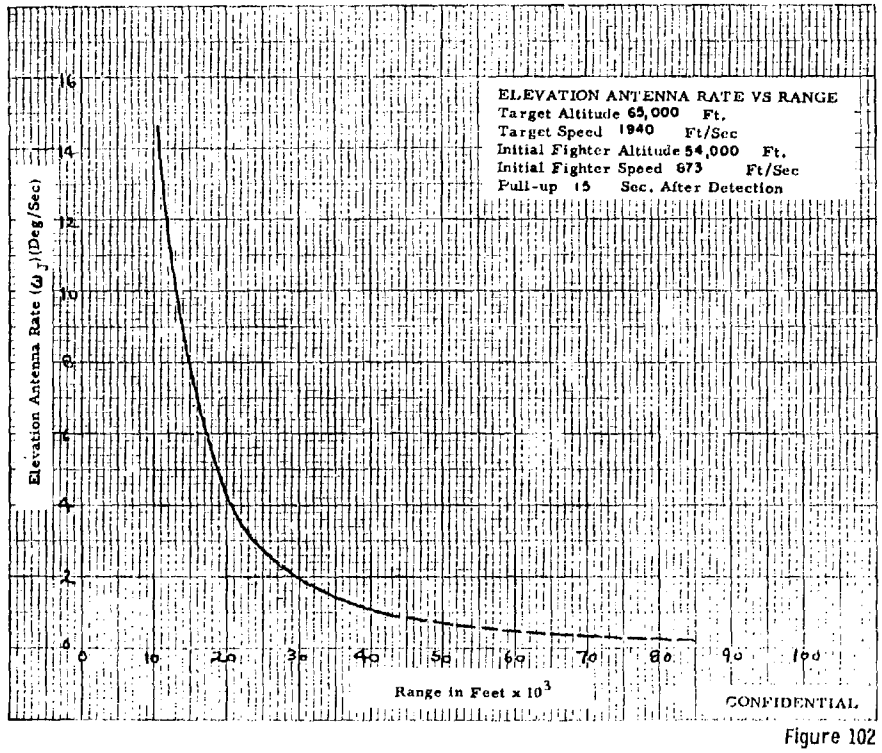
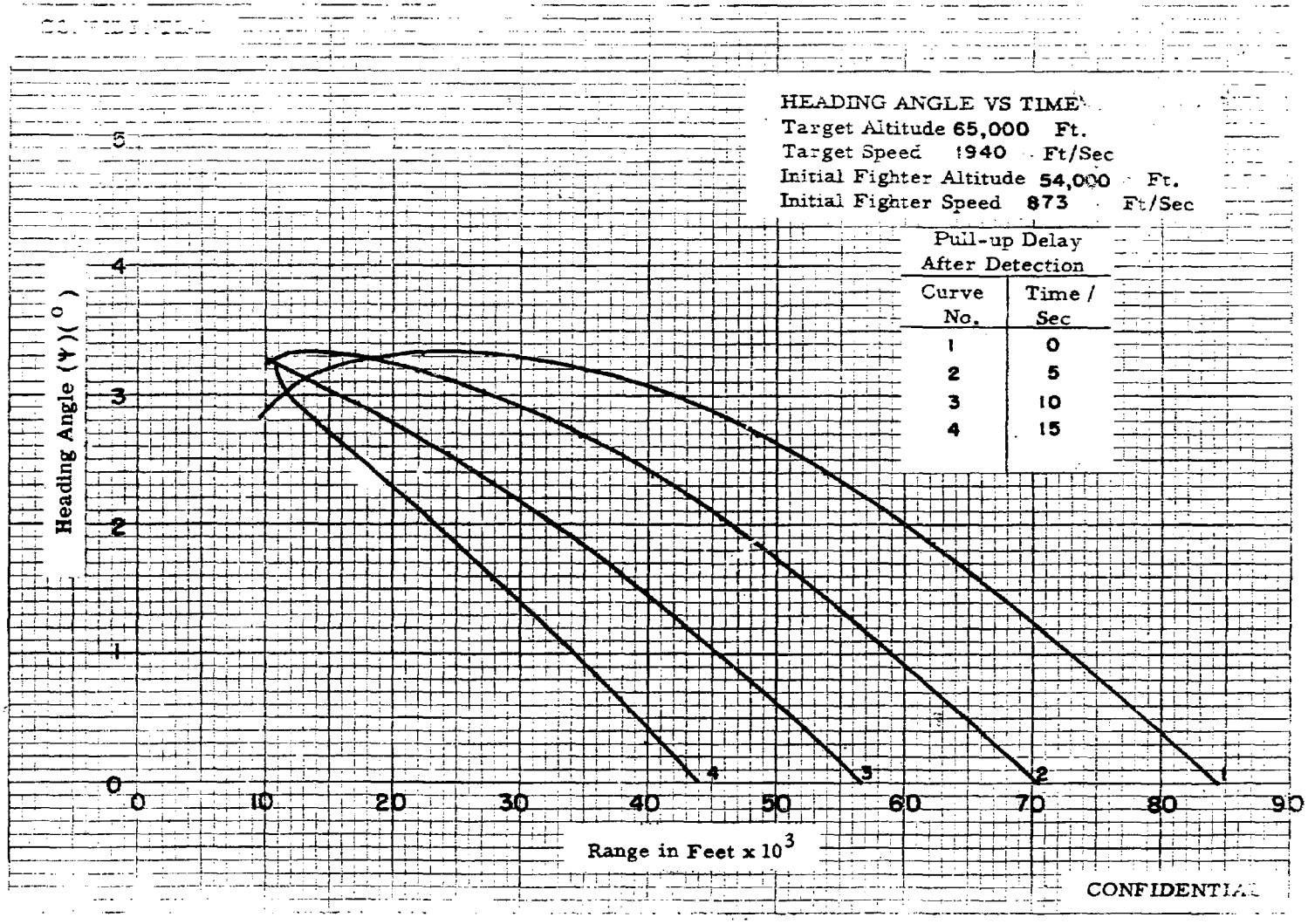
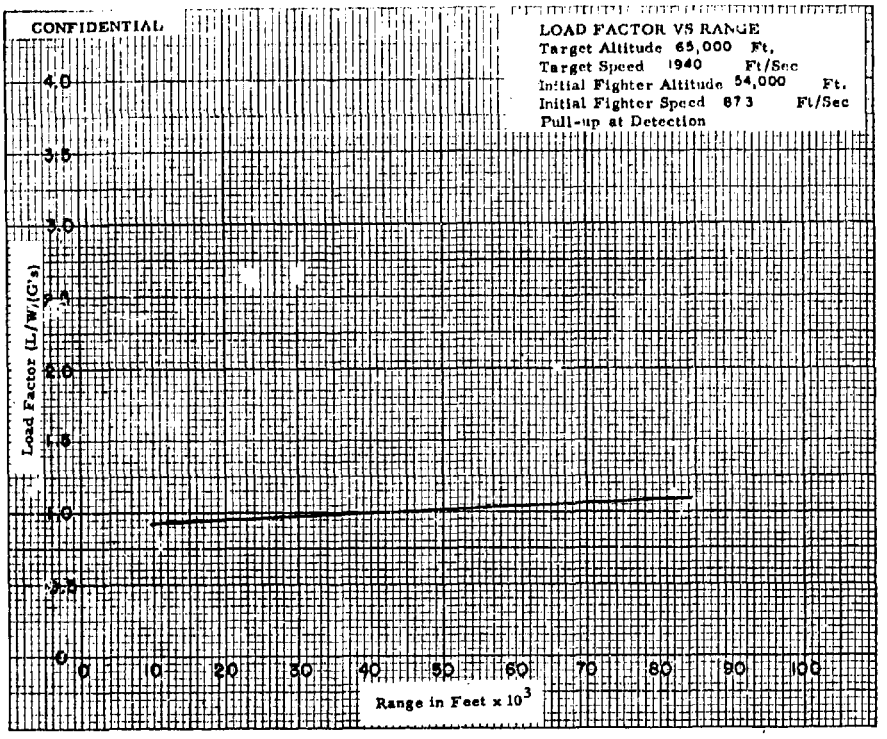

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Elevation Antenna Rate (ω_E)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 102


HEADING ANGLE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time / Sec
1 | 0
2 | 5
3 | 10
4 | 15
Heading Angle (Ψ)(°)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90
1
2
3
4
5
CONFIDENTIAL

Figure


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

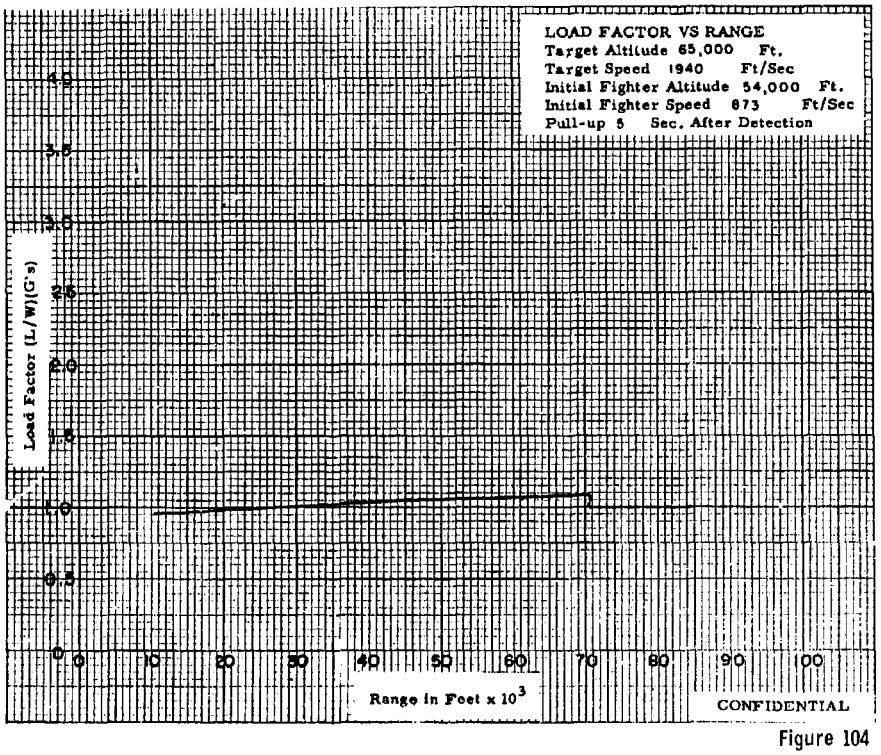
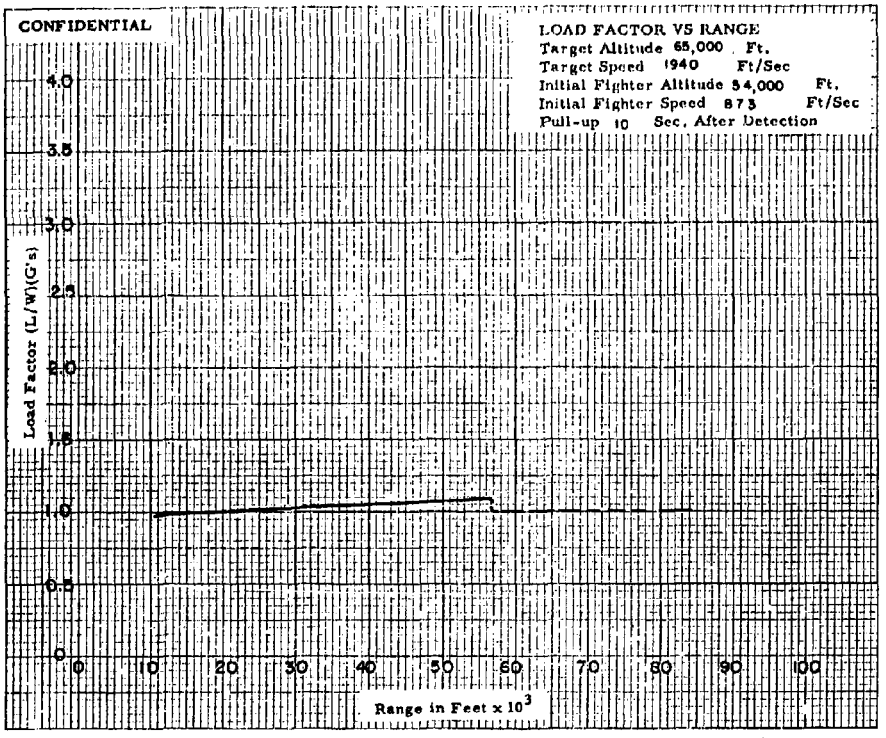

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 5 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 104


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

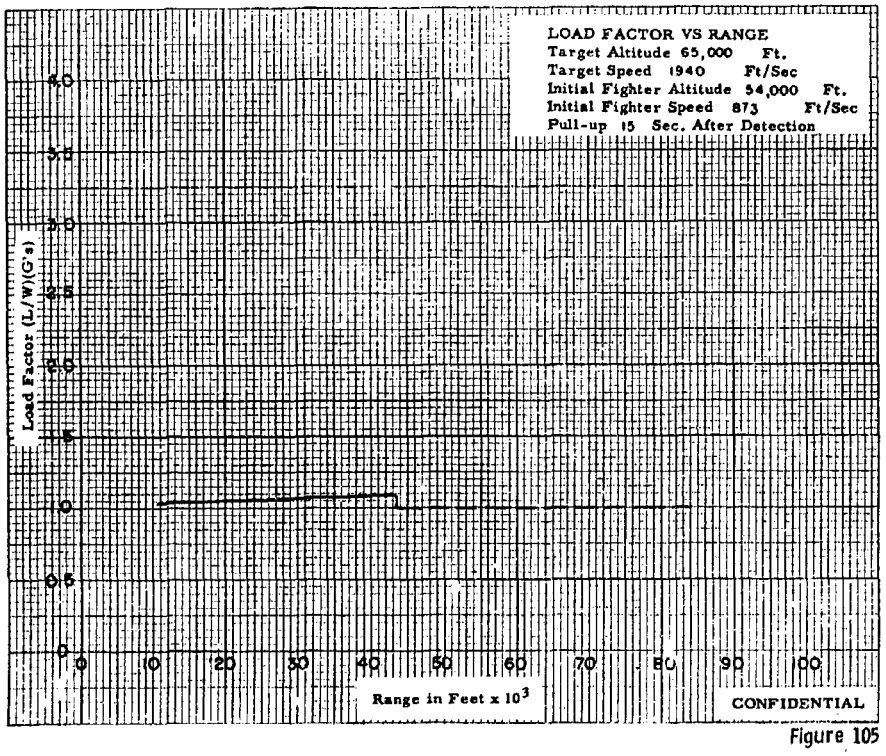

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 105

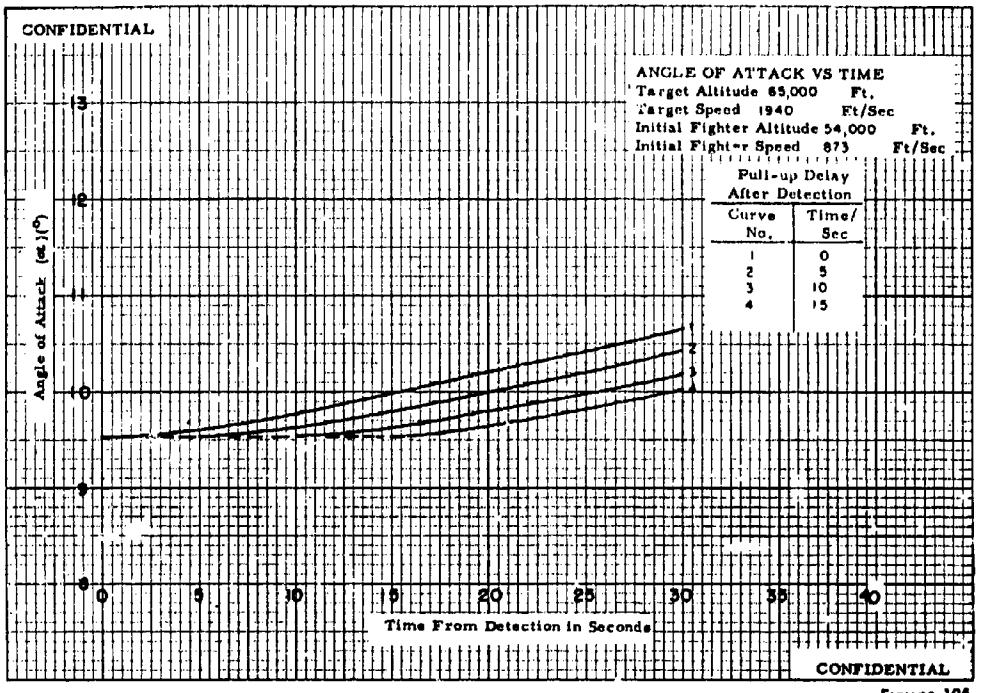


Figure 106

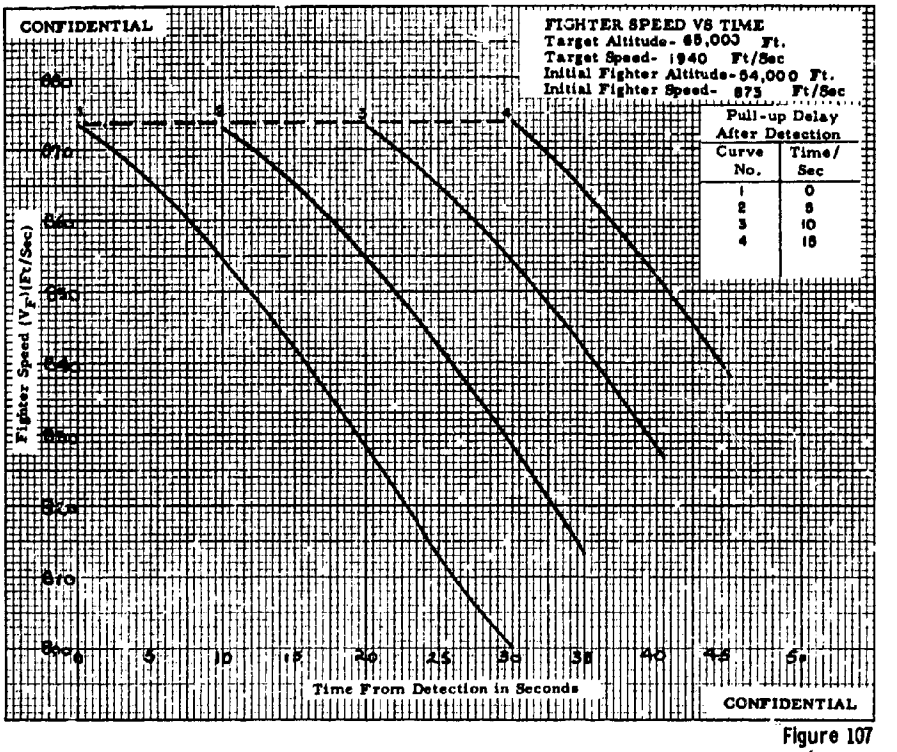
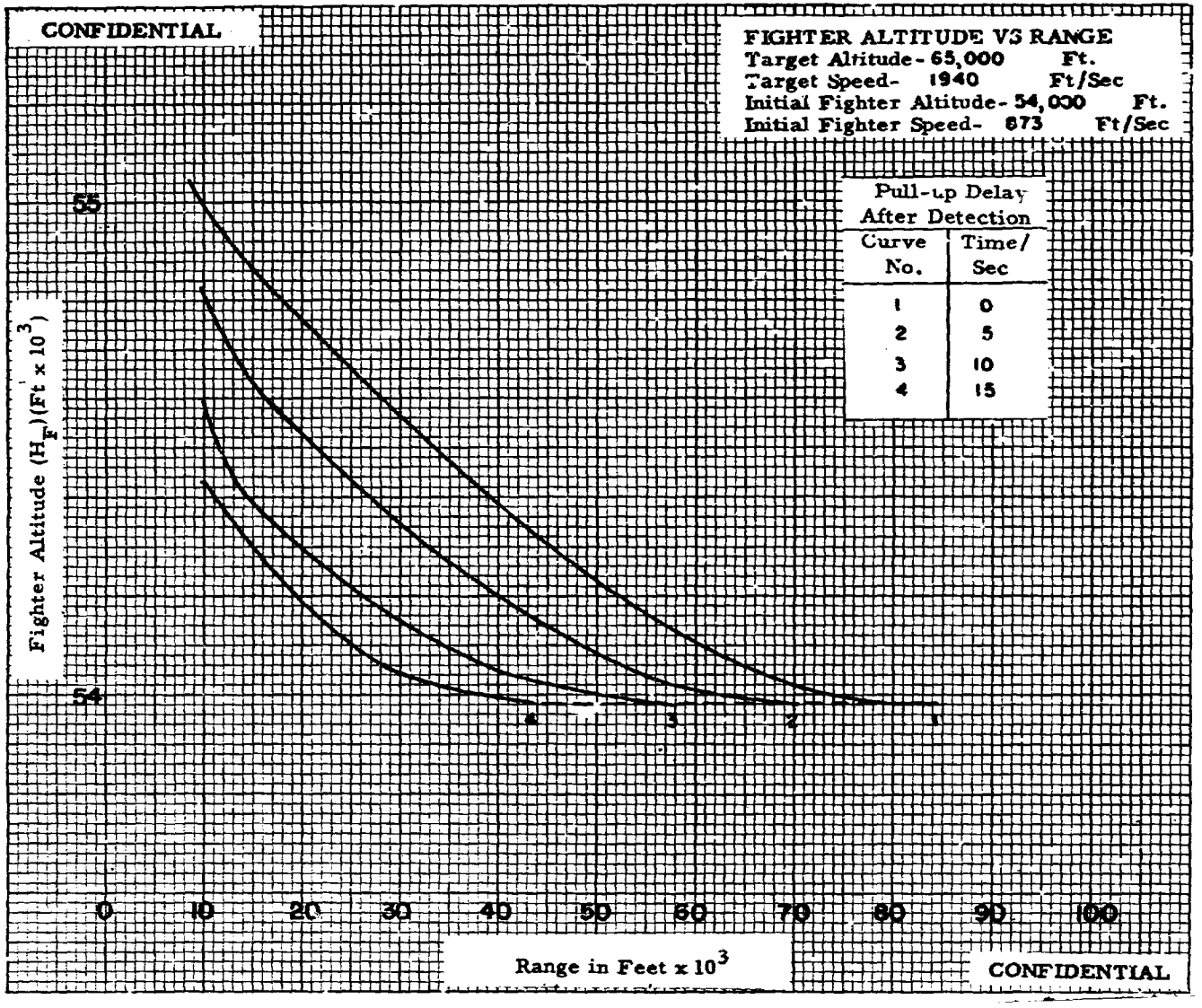
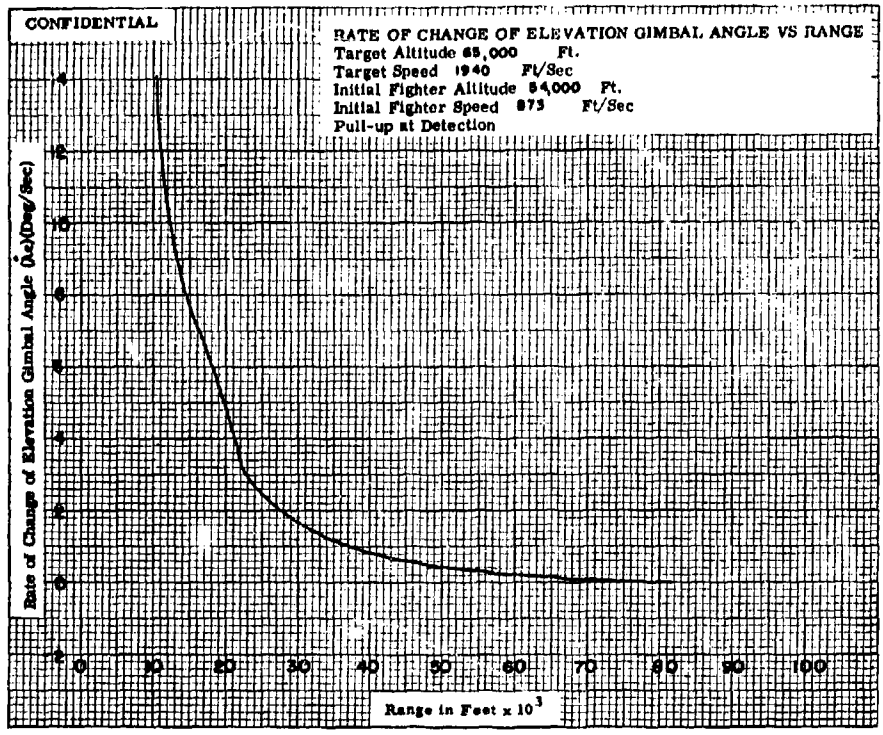


Figure 107


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 54,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 5
3 | 10
4 | 15
55
54
Fighter Altitude (H_F)(Ft x 10^3)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle (Δε)(Deg/Sec)
Range in Feet x 10^3

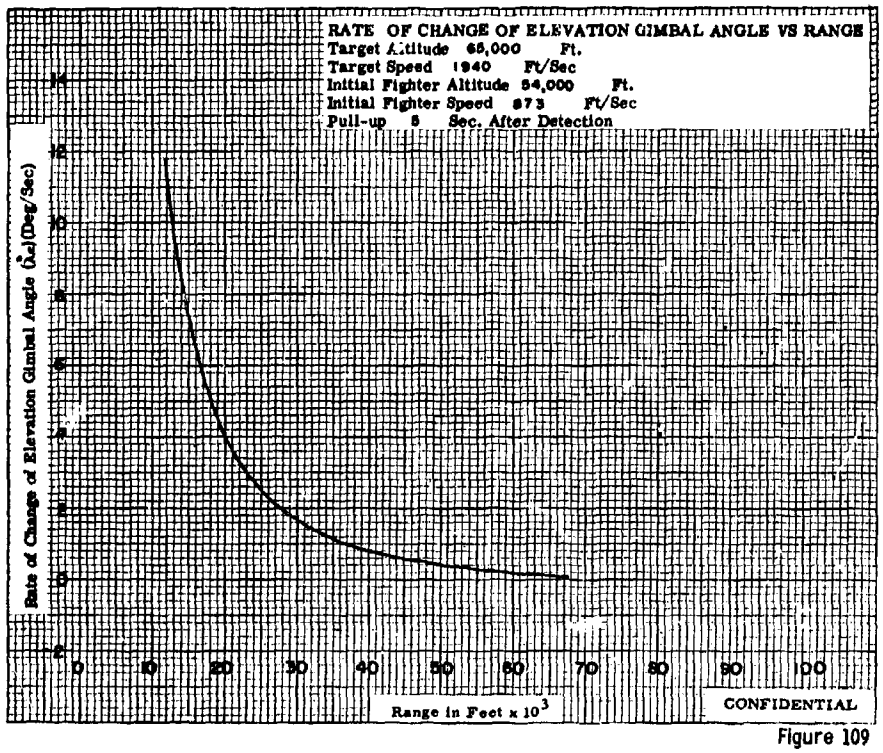
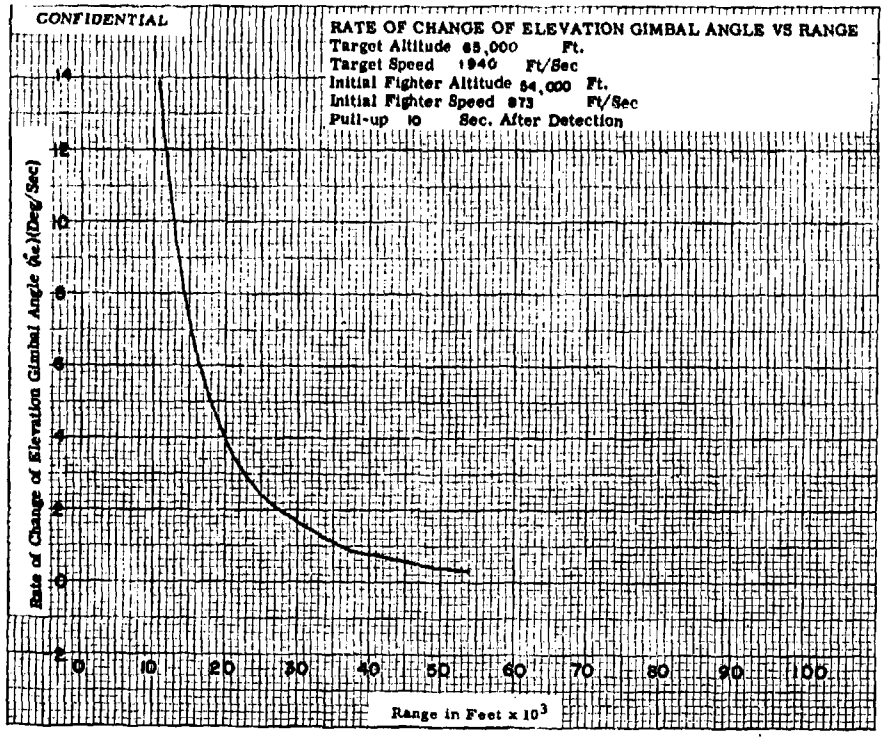

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (Δε)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 109


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (ε̇e)(Deg/Sec)
14
12
10
8
6
4
2
0
-2
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

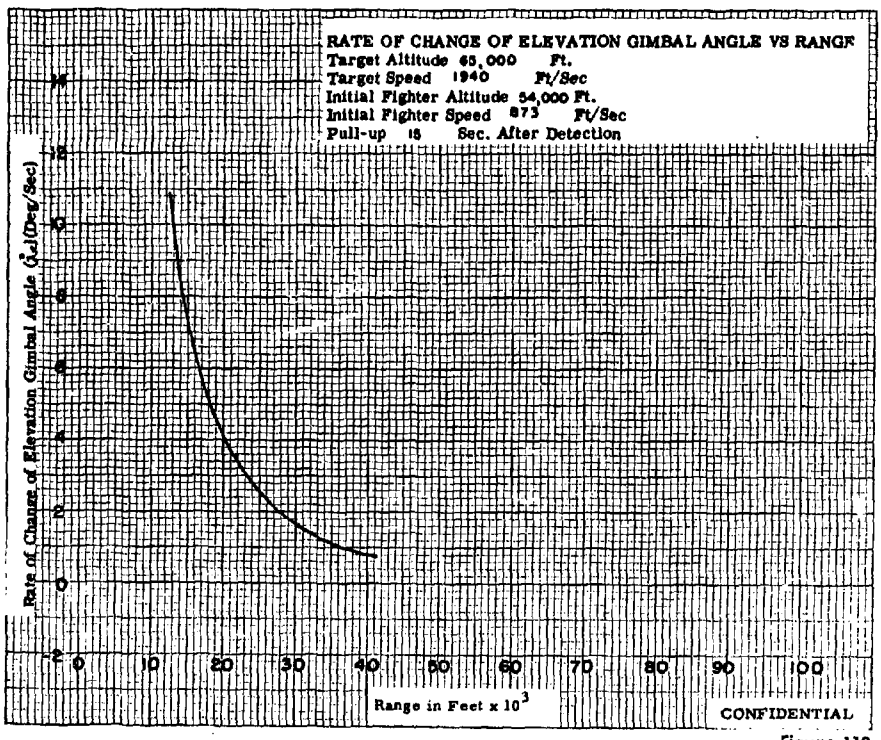
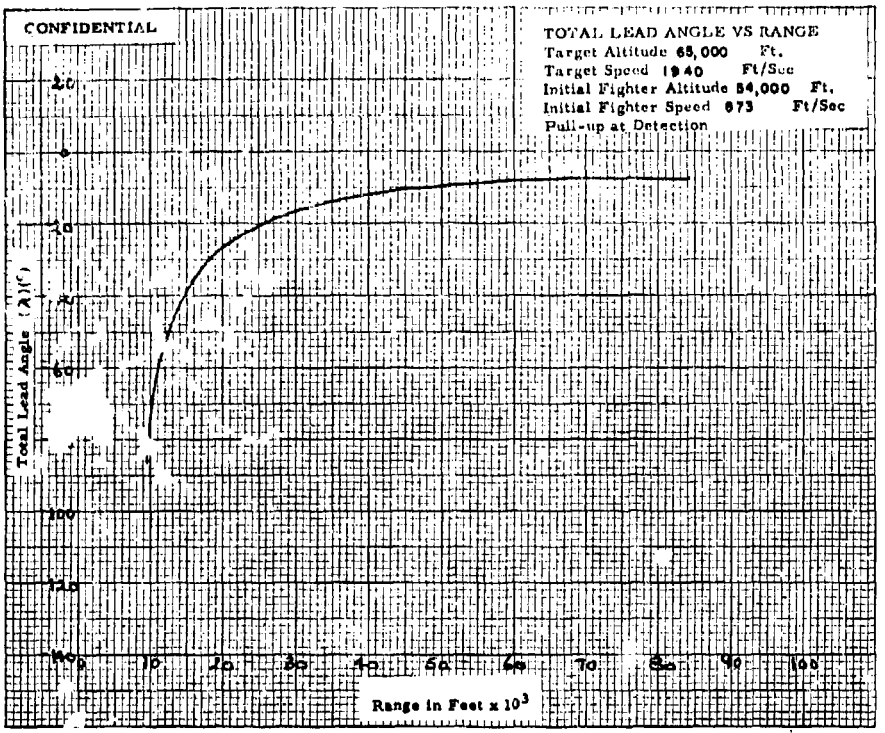

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (ε̇e)(Deg/Sec)
14
12
10
8
6
4
2
0
-2
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 110


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Total Lead Angle (λ)(°)
Range in Feet x 10³

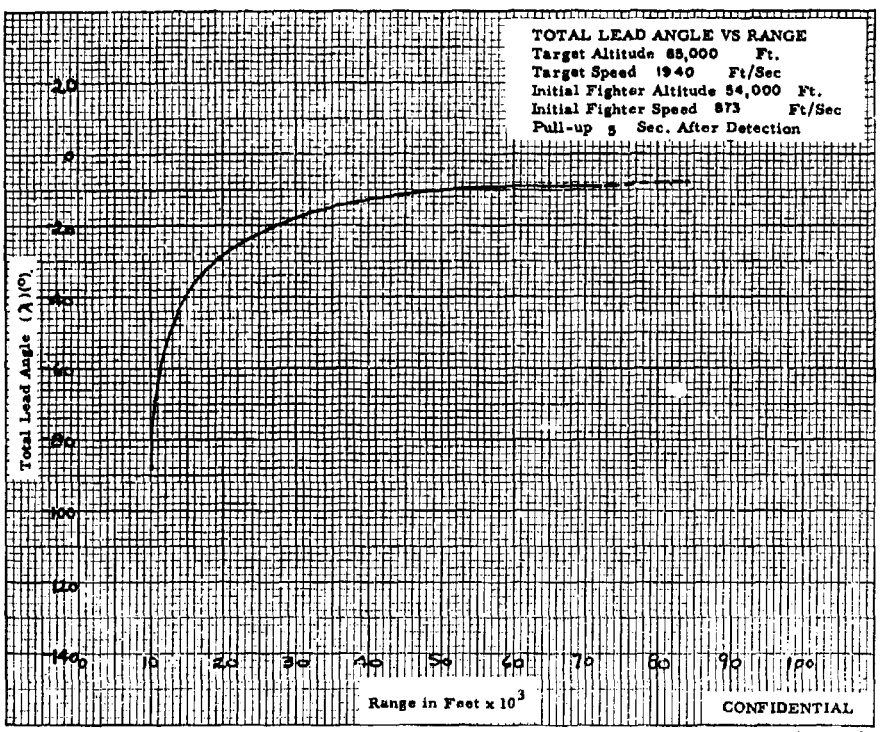
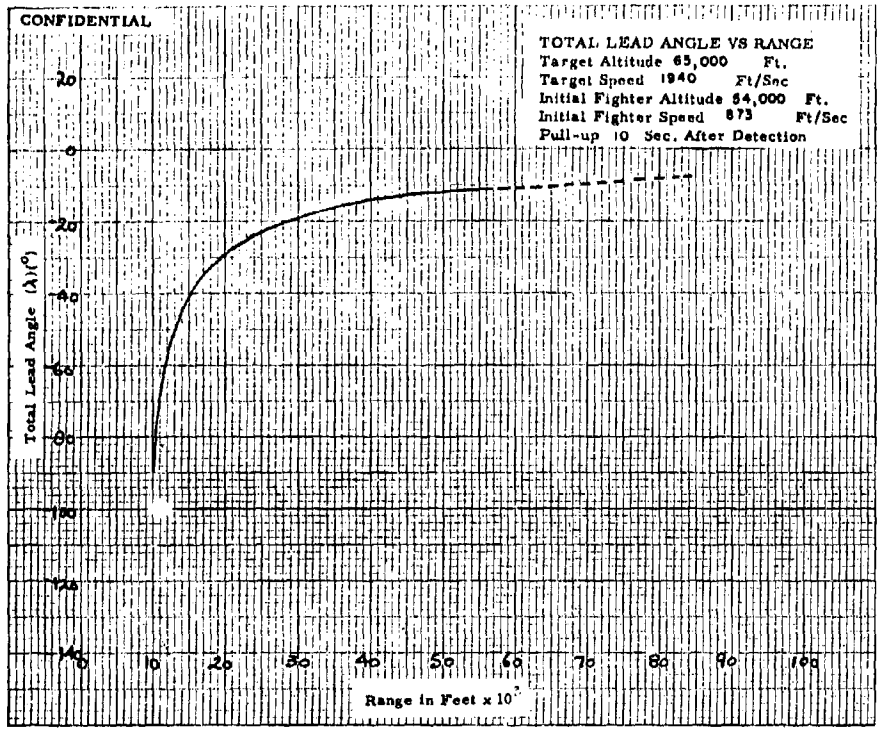

TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 5 Sec. After Detection
Total Lead Angle (λ)(°)
Range in Feet x 10³
CONFIDENTIAL

Figure 111


TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Total Lead Angle (λ)(°)
20
0
-20
-40
-60
-80
-100
-120
-140
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

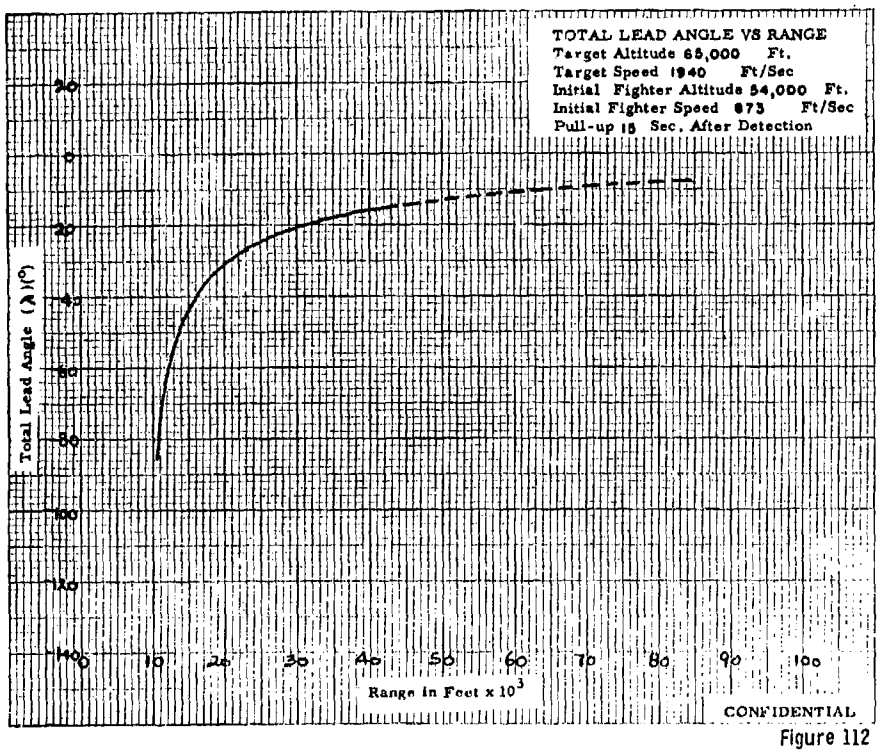
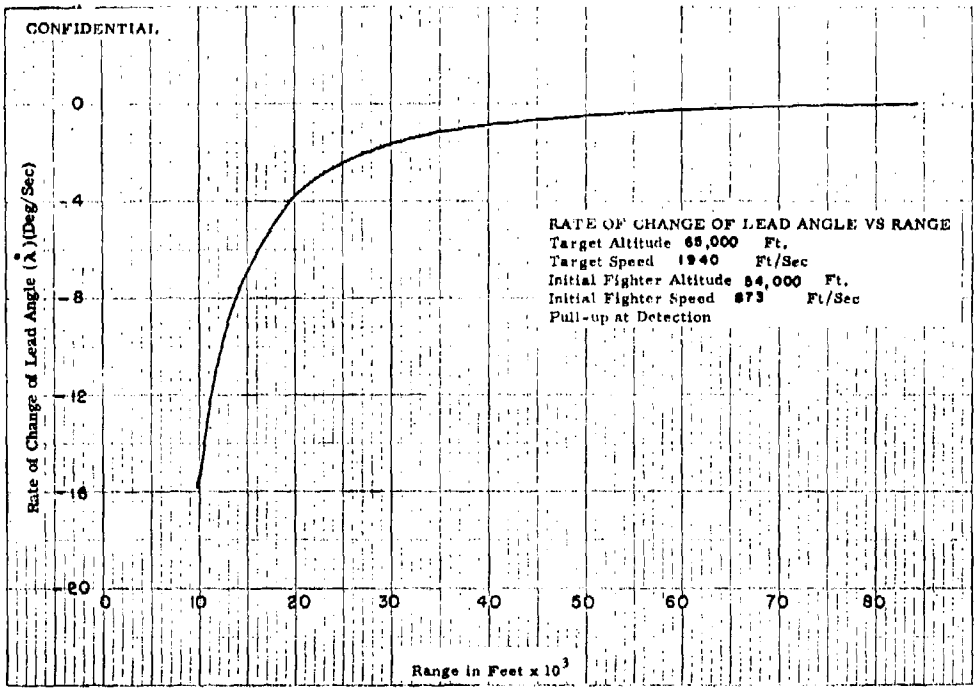

TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Total Lead Angle (λ)(°)
20
0
-20
-40
-60
-80
-100
-120
-140
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 112


Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
0
-4
-8
-12
-16
-20
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection

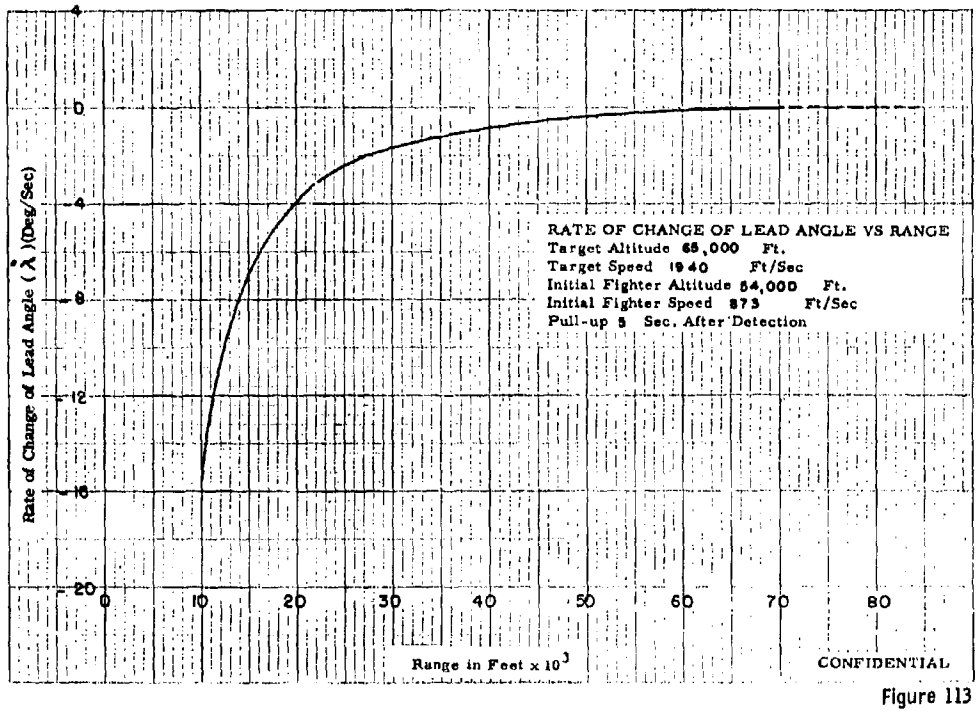
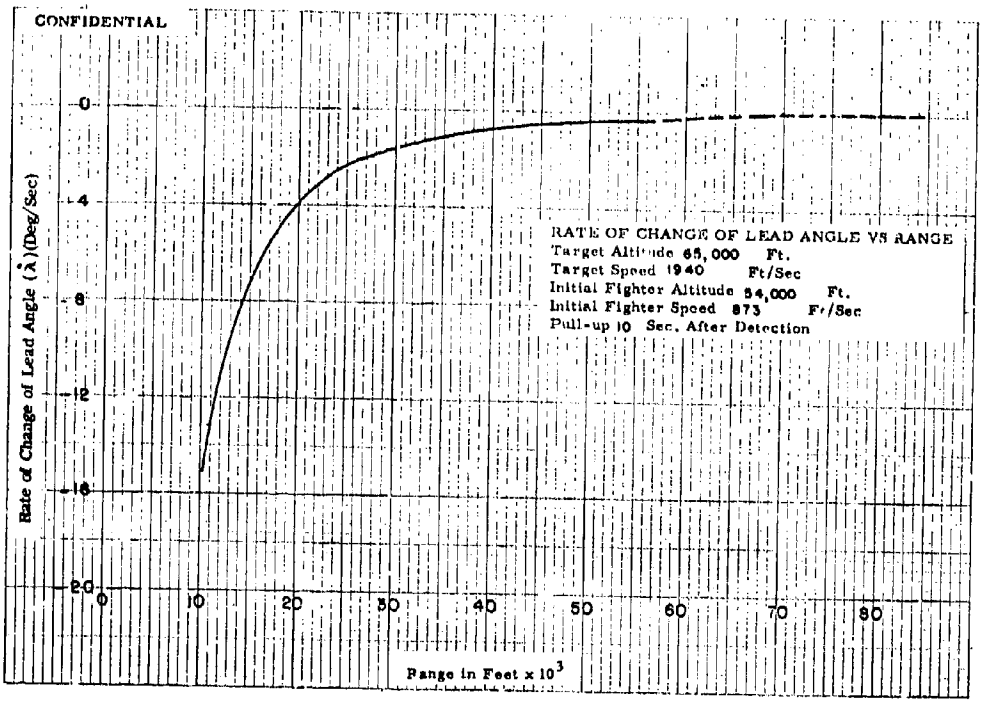

Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
4
0
-4
-8
-12
-16
-20
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 5 Sec. After Detection
CONFIDENTIAL

Figure 113


CONFIDENTIAL
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-4
-8
-12
-16
-20
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection

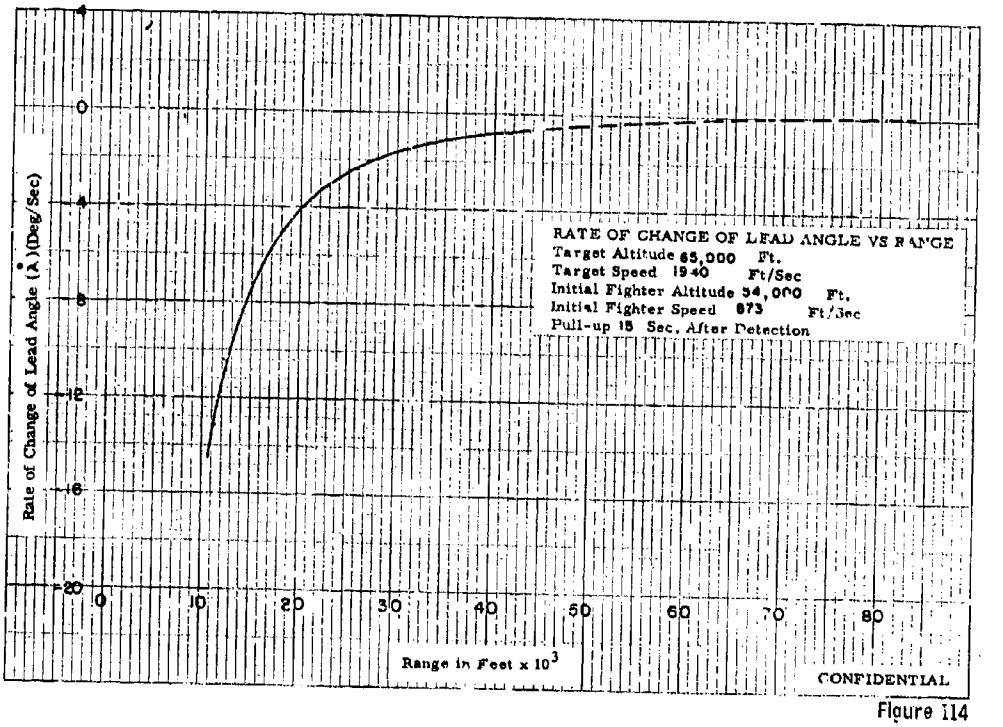
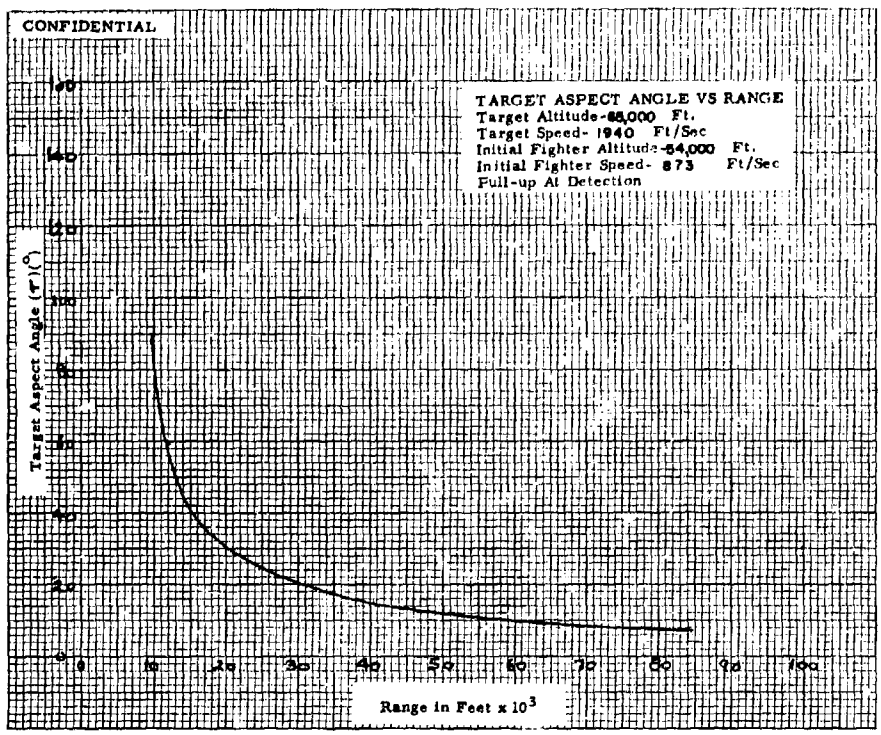

Rate of Change of Lead Angle (λ̇)(Deg/Sec)
4
0
-4
-8
-12
-16
-20
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
CONFIDENTIAL

Figure 114


TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-54,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Full-up At Detection
Target Aspect Angle (T)(°)
Range in Feet x 10³

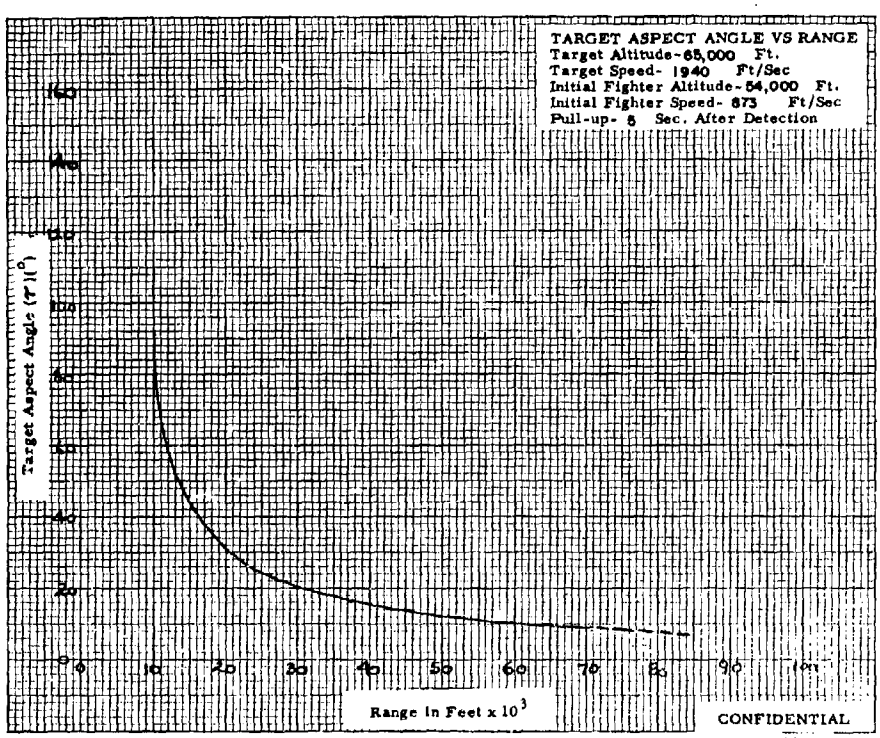
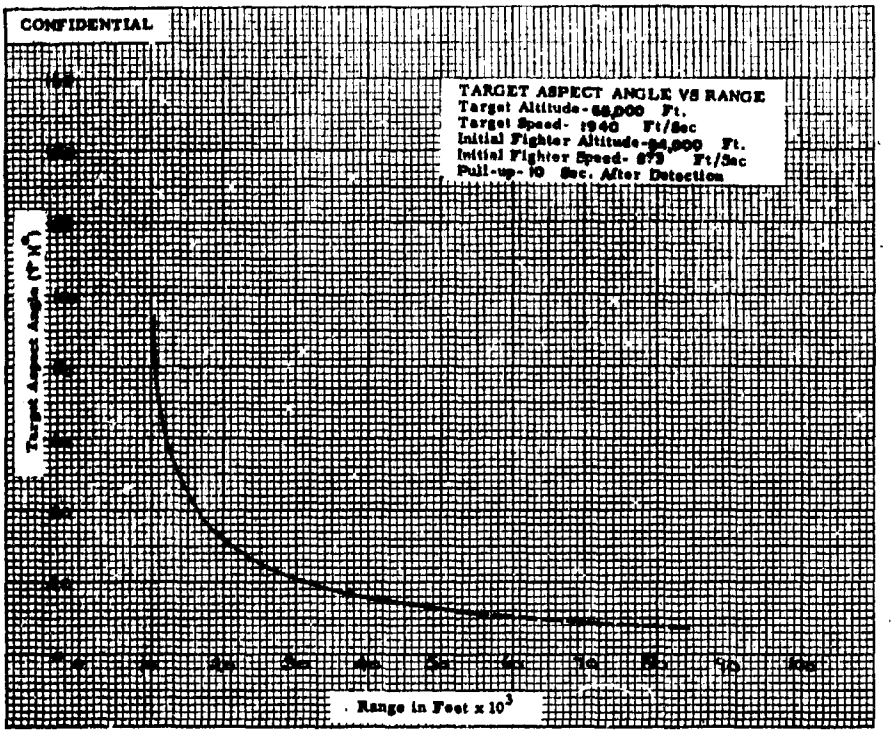

TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-54,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 5 Sec. After Detection
Target Aspect Angle (T)(°)
Range in Feet x 10³

Figure 115


TARGET ASPECT ANGLE VS RANGE
Target Altitude- 68,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 84,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 10 Sec. After Detection
Target Aspect Angle (ψ A)
Range in Feet x 10³

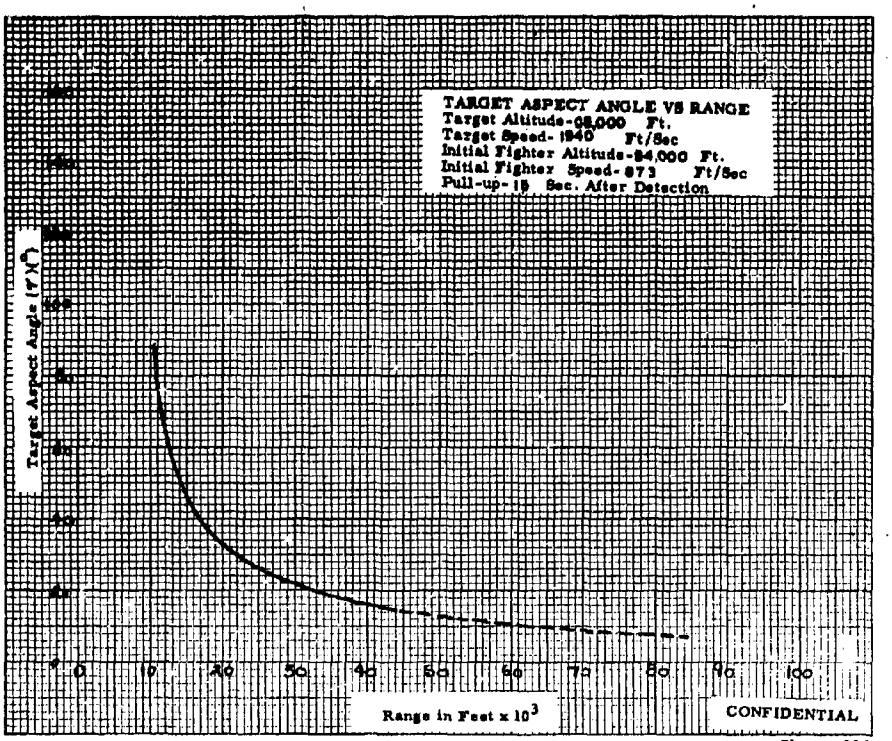
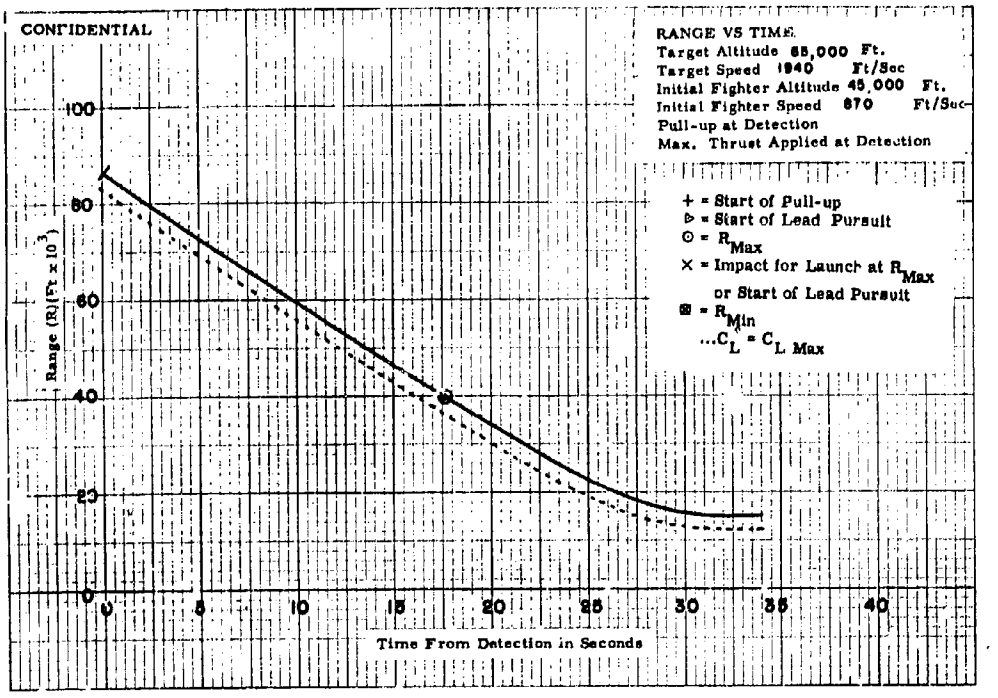

TARGET ASPECT ANGLE VS RANGE
Target Altitude- 68,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 84,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 15 Sec. After Detection
Target Aspect Angle (ψ A)
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10³
CONFIDENTIAL

Figure 116


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1040 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 670 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
Time From Detection in Seconds

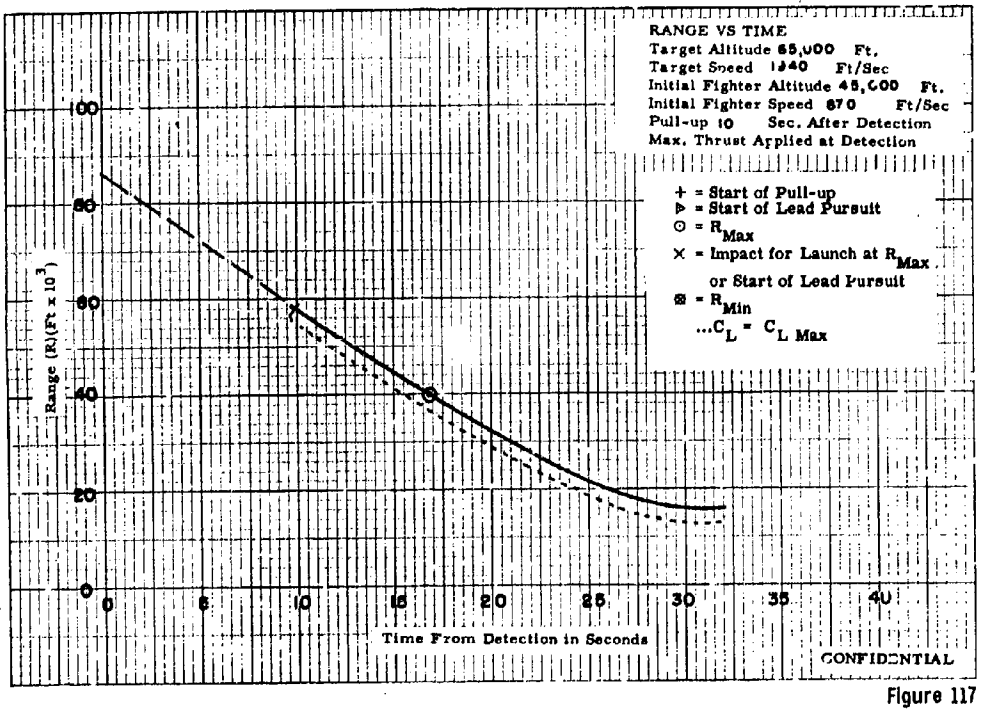
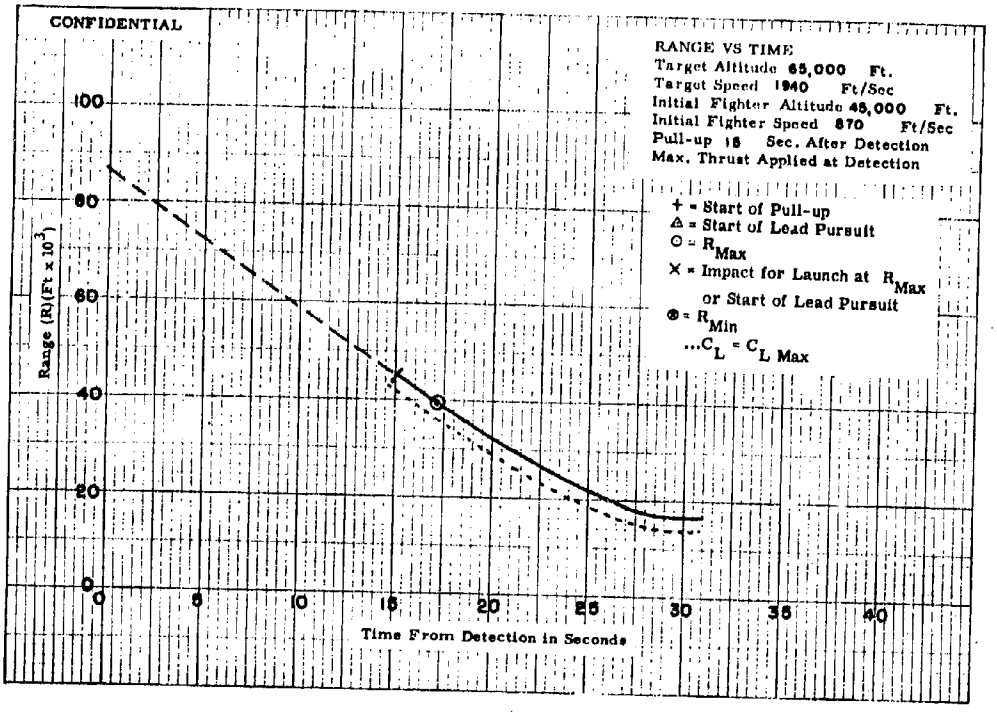

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1040 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 670 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
Time From Detection in Seconds
CONFIDENTIAL

Figure 117


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
Time From Detection in Seconds

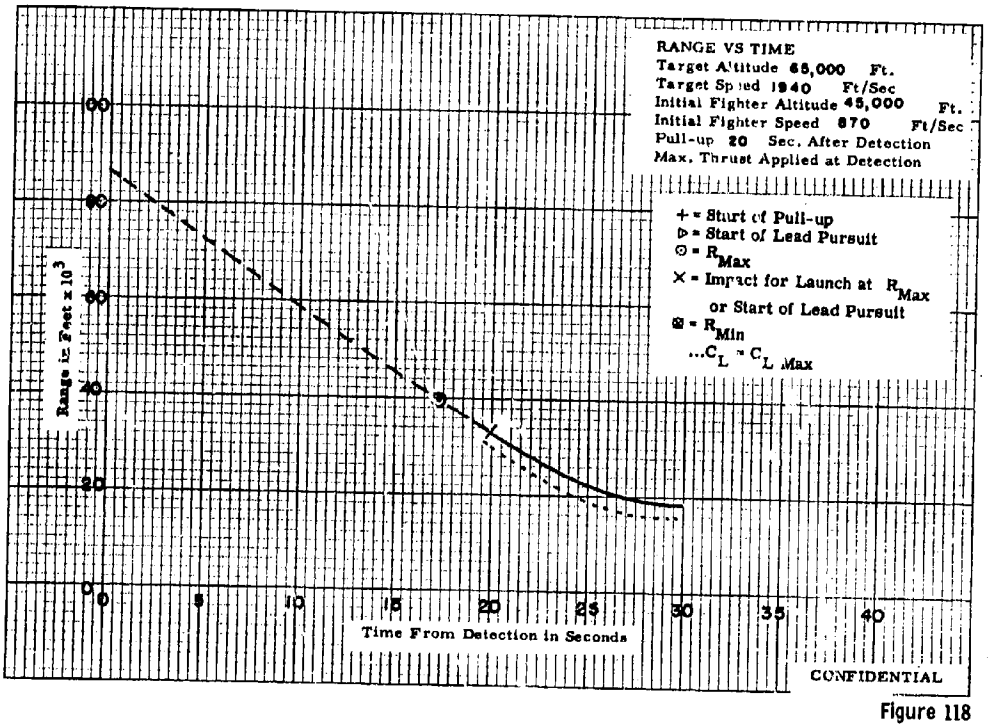
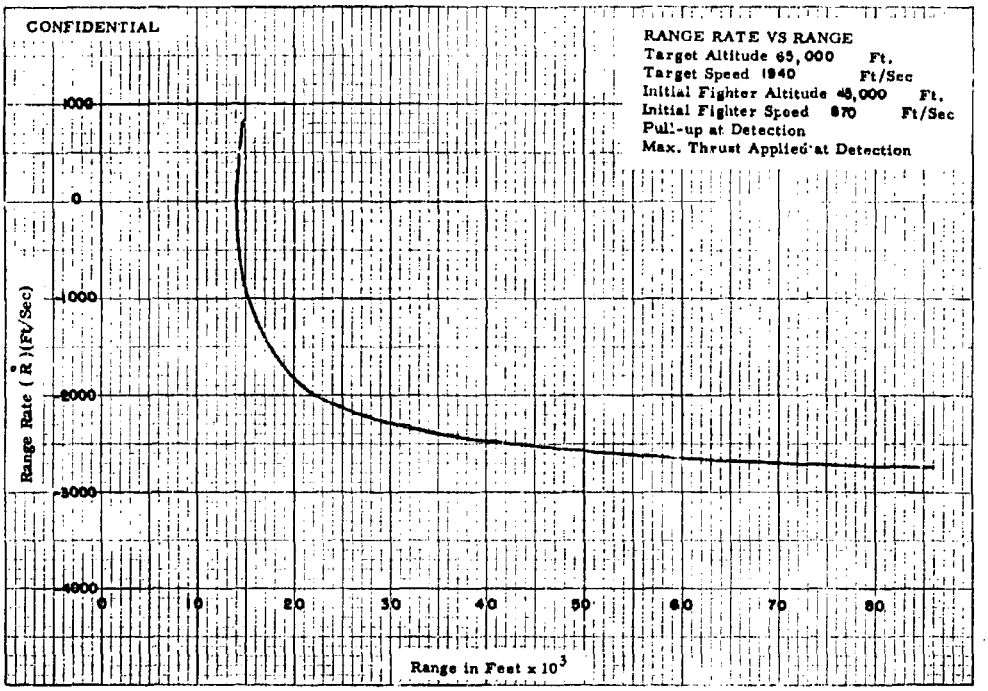

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range in Feet x 10^3
60
40
20
0
0
5
10
15
20
25
30
35
40
Time From Detection in Seconds
CONFIDENTIAL

Figure 118


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

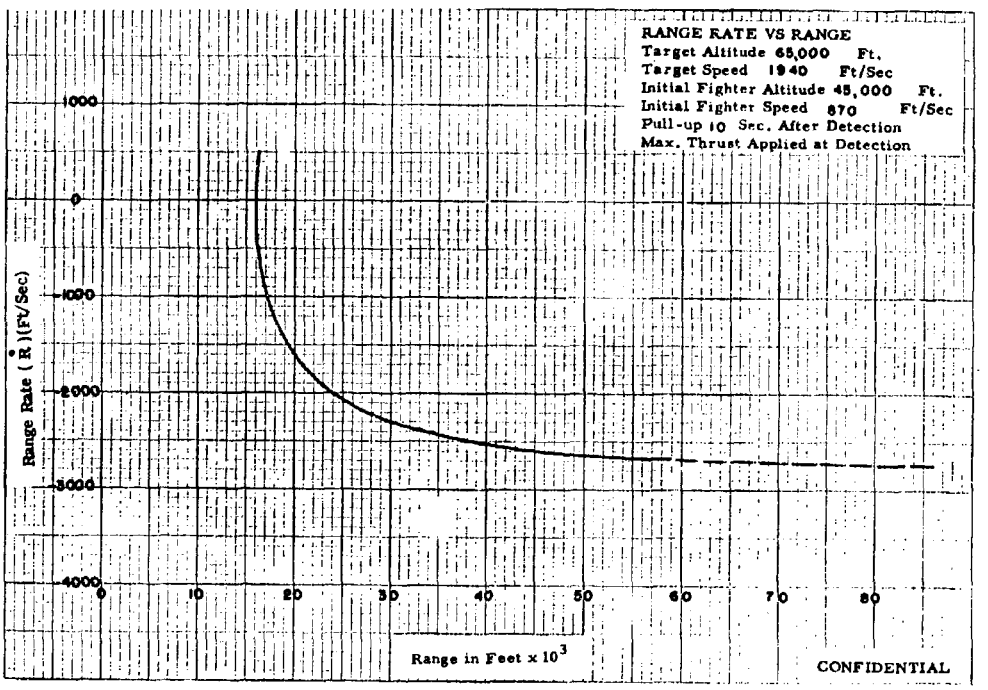
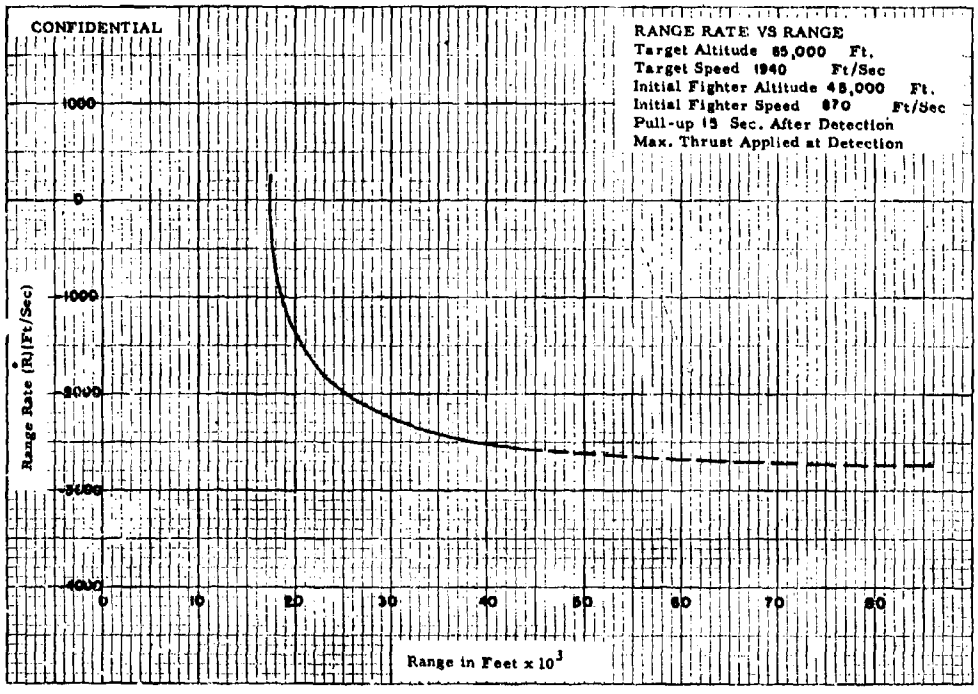

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 119


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

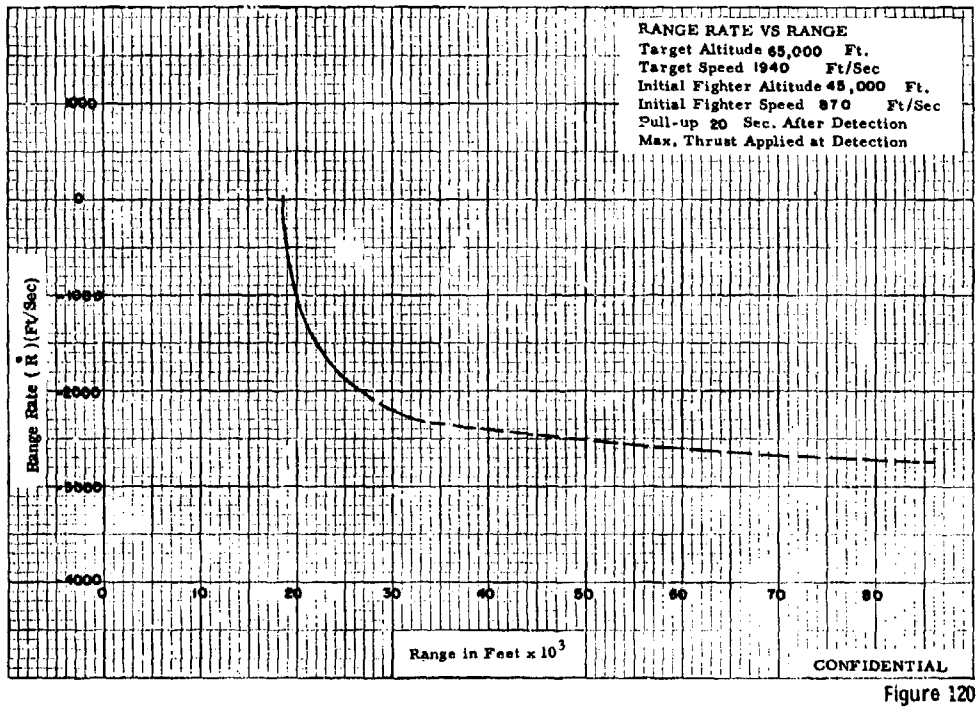

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 120

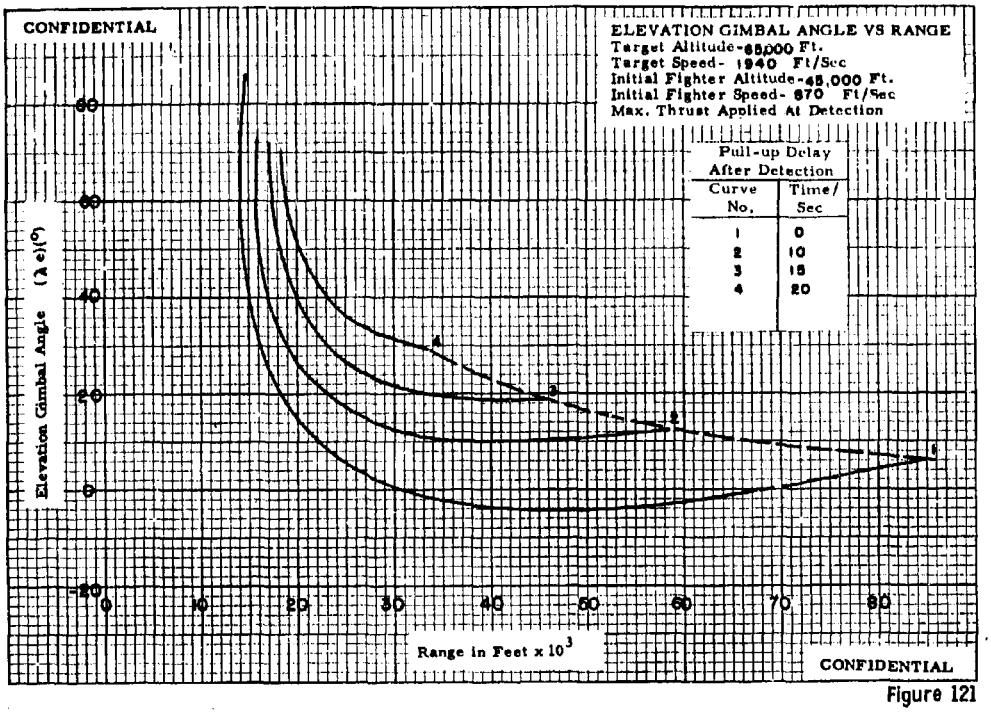


Figure 121

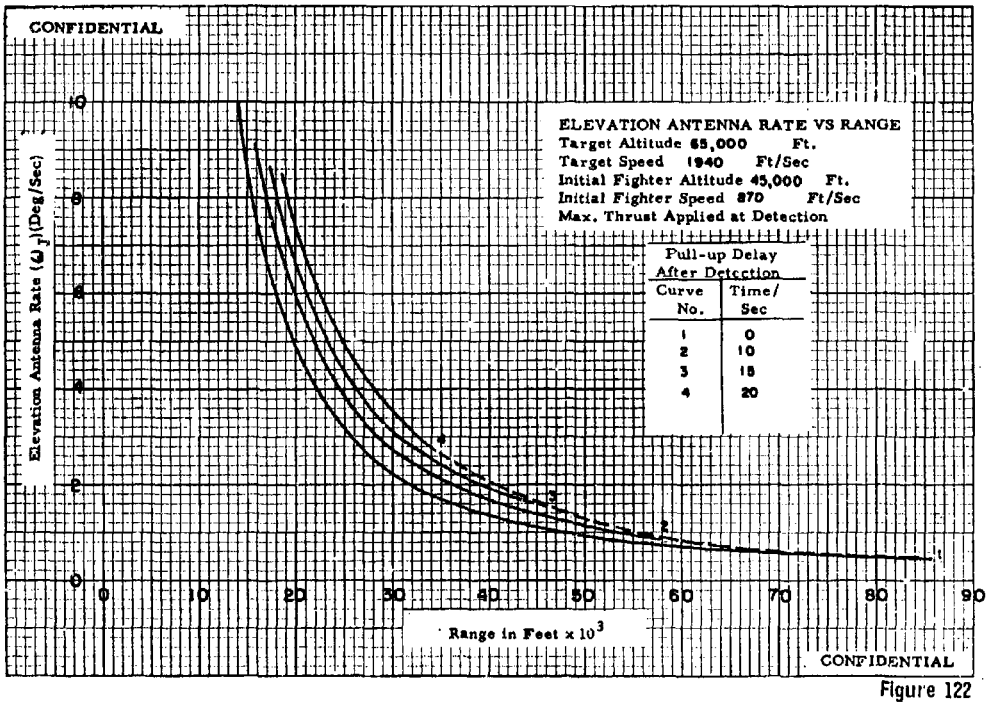


Figure 122

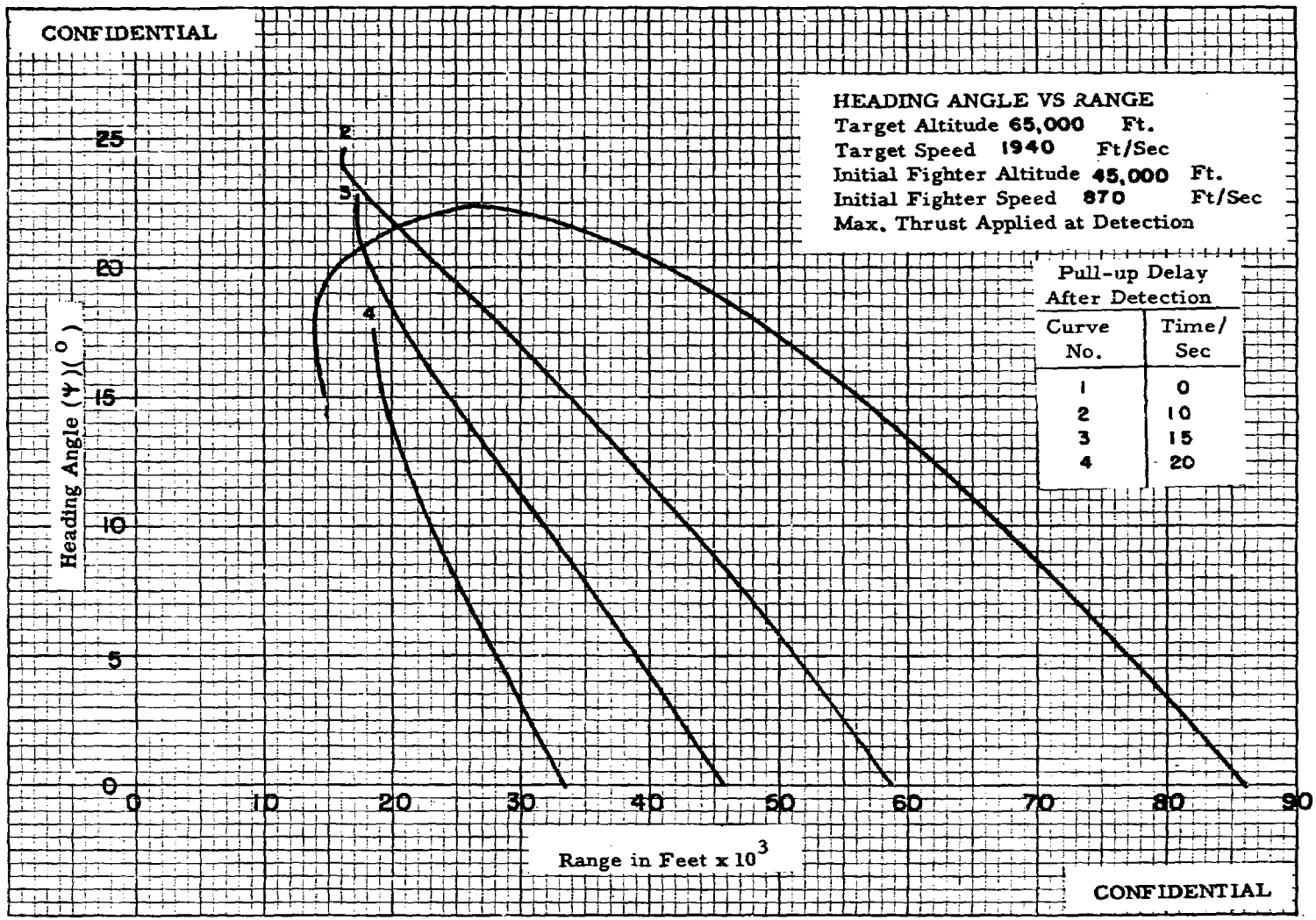
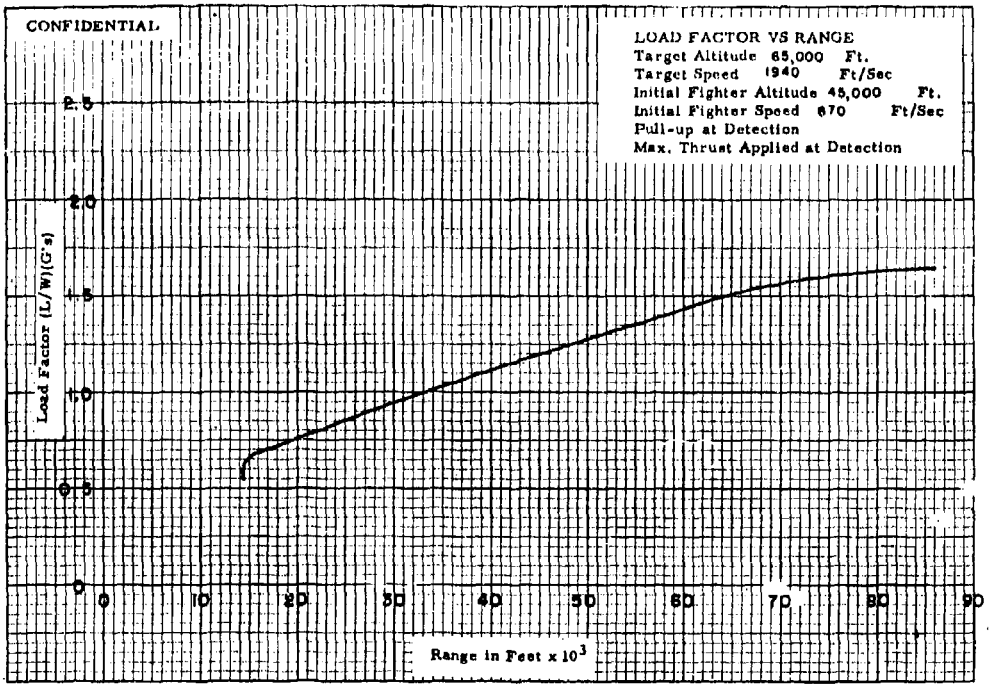

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 15
4 | 20
Heading Angle (Ψ)(°)
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3
CONFIDENTIAL

Figure 123


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 670 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3

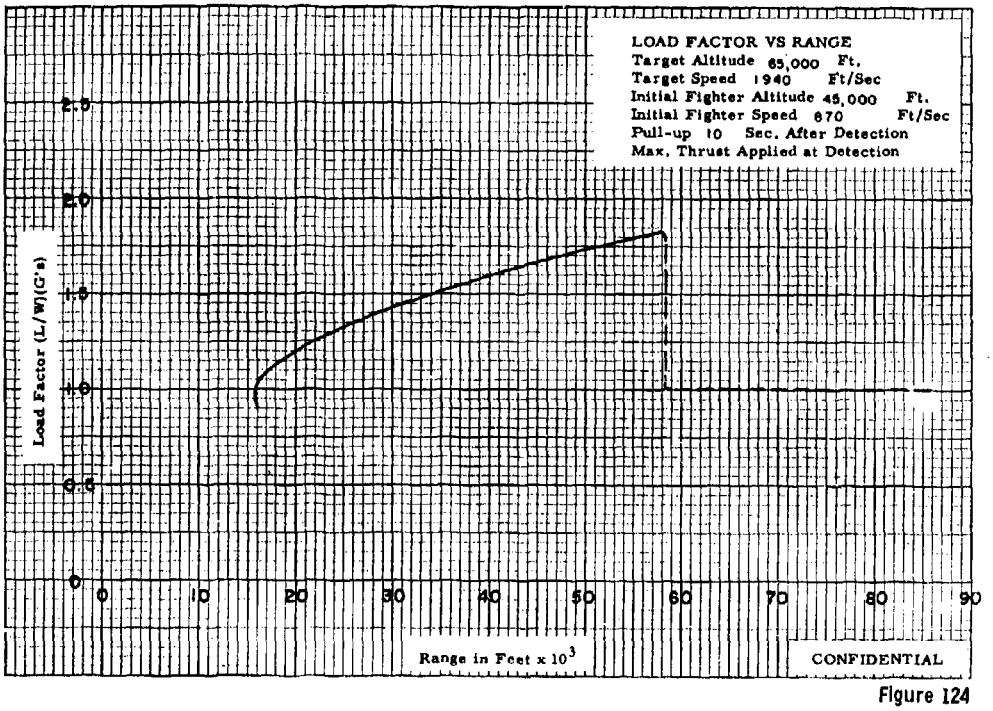
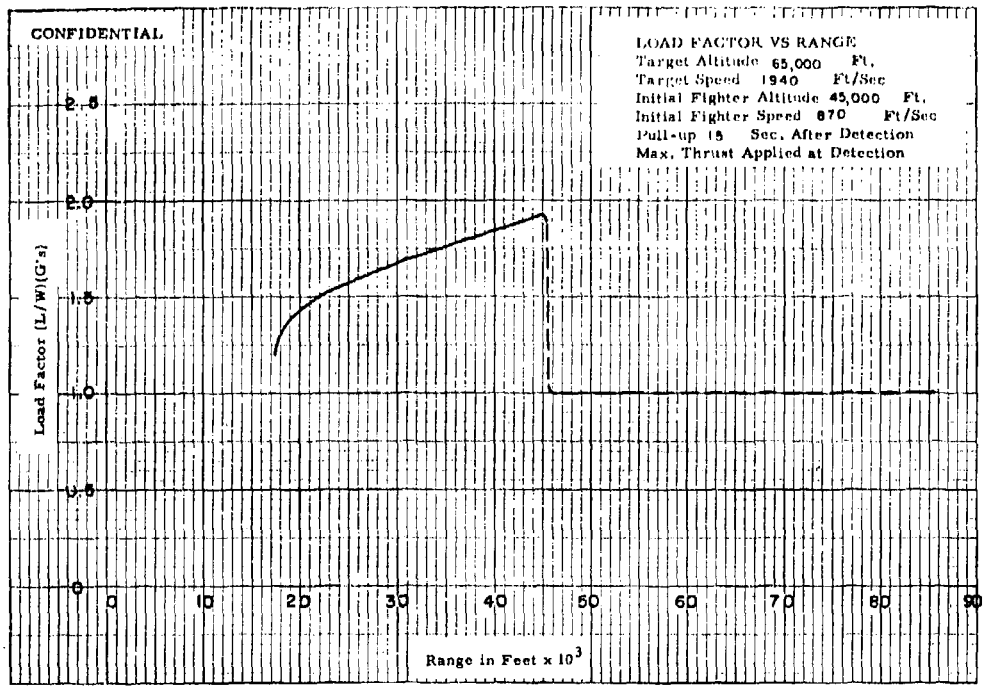

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 670 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3
CONFIDENTIAL

Figure 124


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3

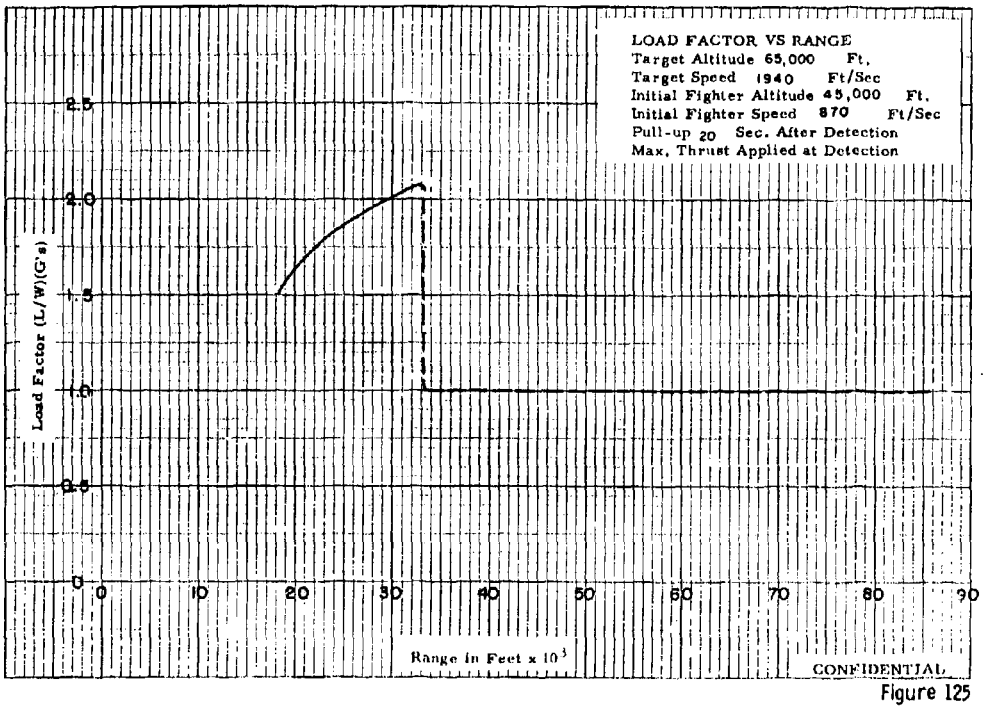

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3
CONFIDENTIAL

Figure 125

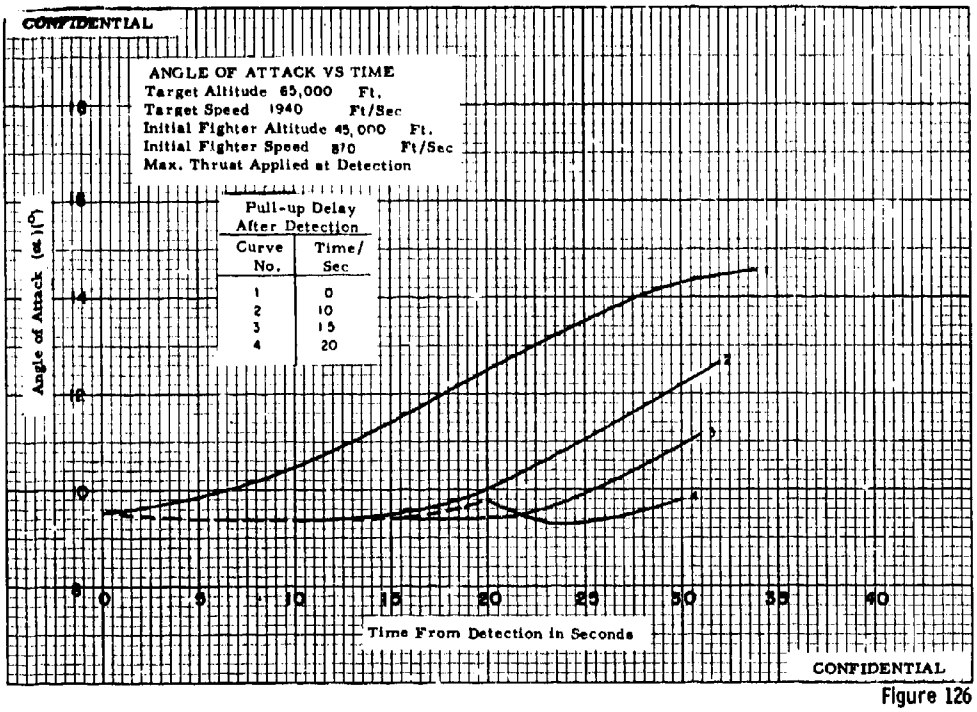


Figure 126

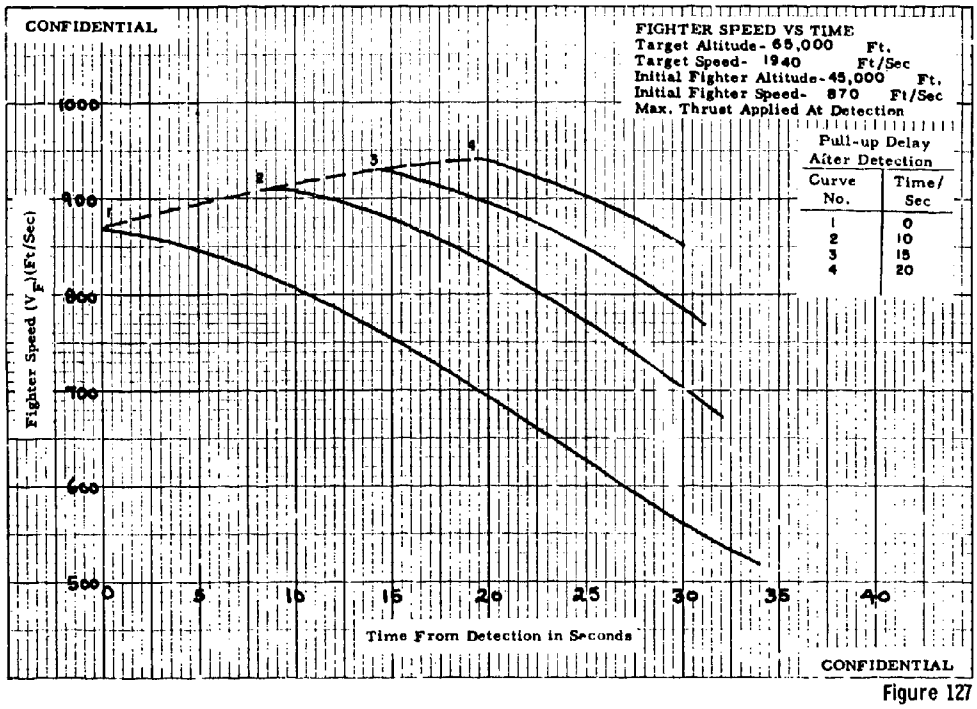


Figure 127

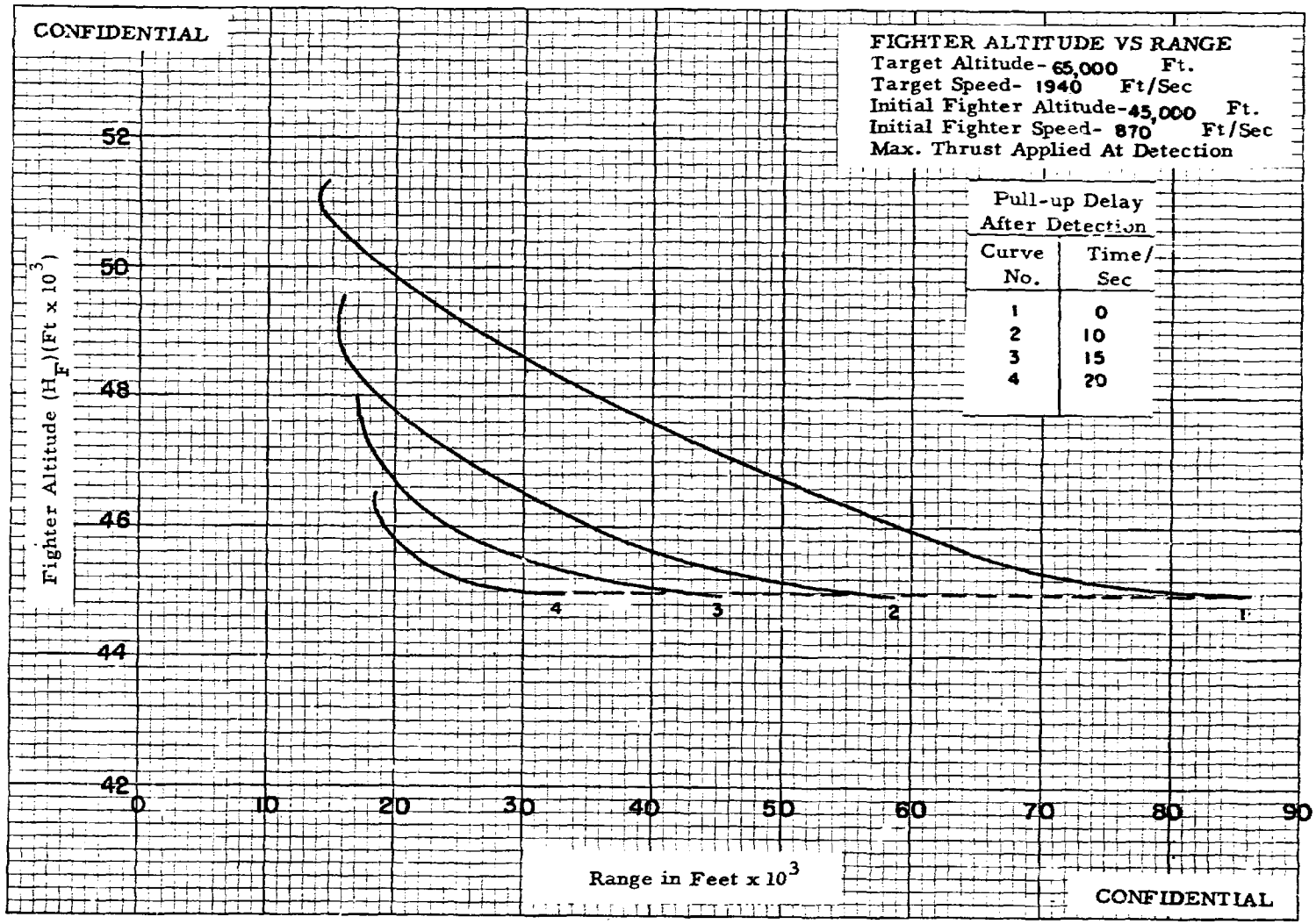
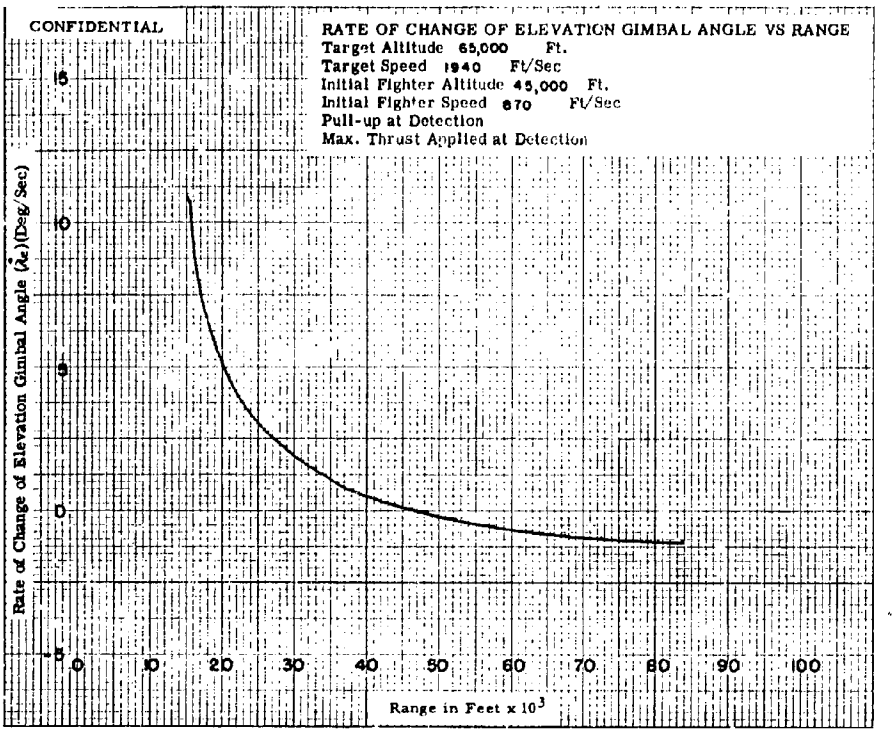

CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 45,000 Ft.
Initial Fighter Speed- 870 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
3 | 15
4 | 20
Fighter Altitude (H_F)(Ft x 10^3)
52
50
48
46
44
42
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3
CONFIDENTIAL

Figure 128


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

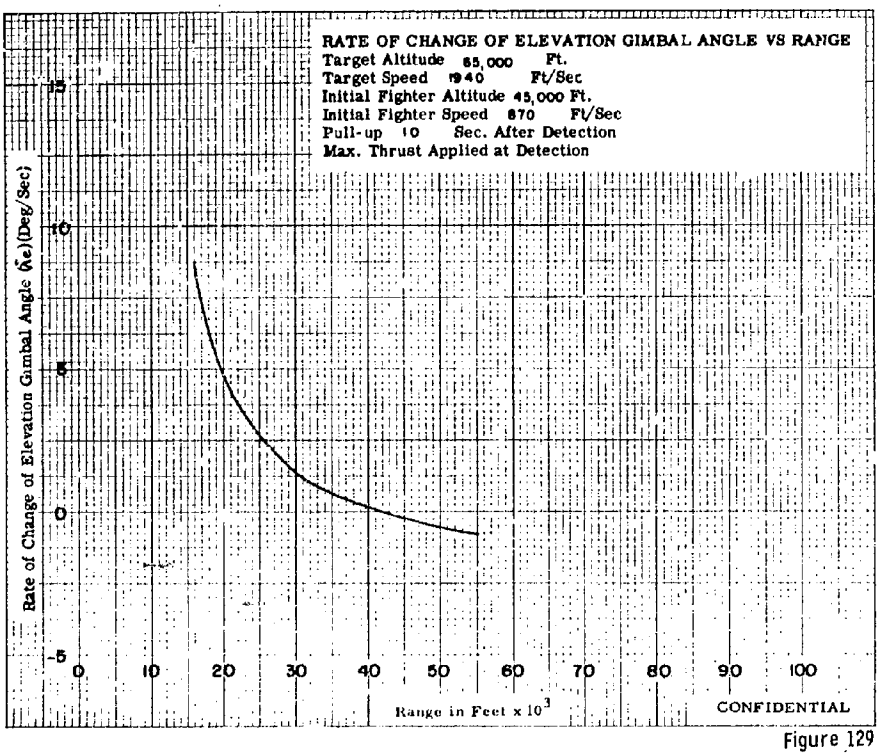
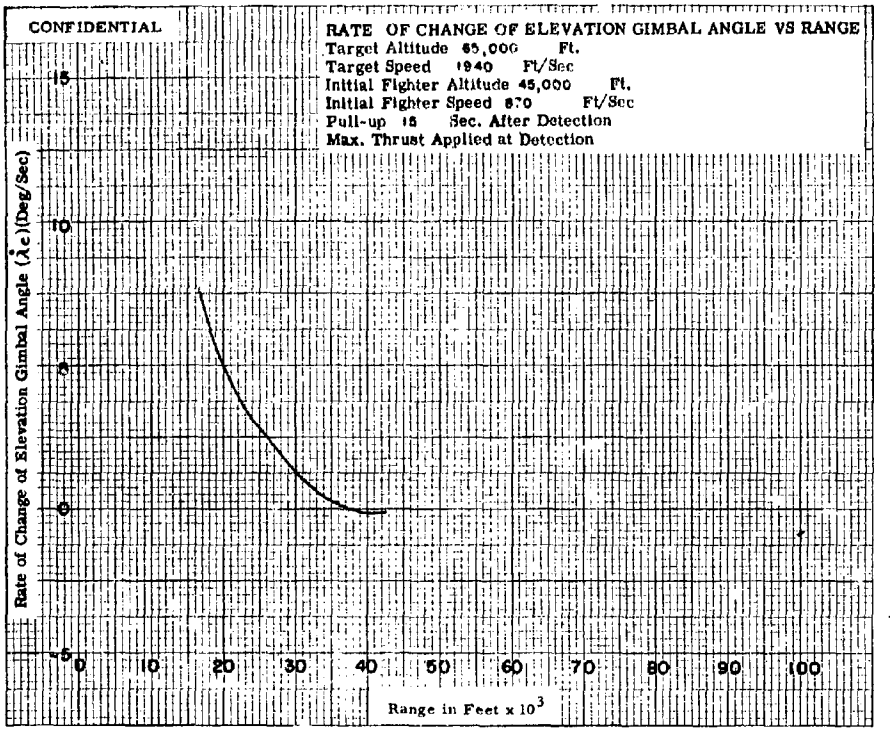

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 129


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇c)(Deg/Sec)
15
10
5
0
-5
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

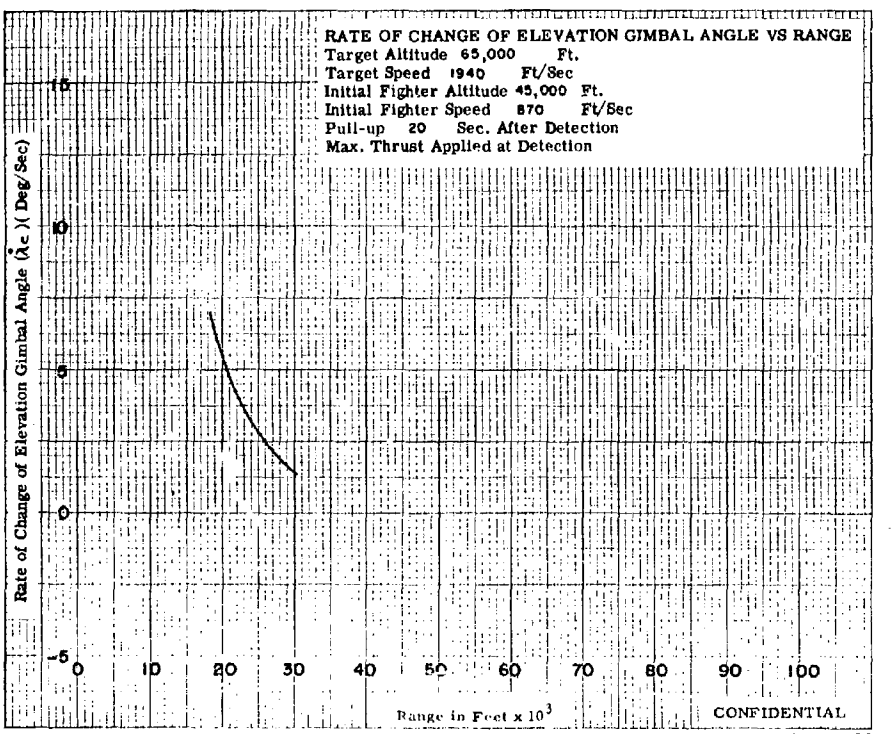

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇c)(Deg/Sec)
15
10
5
0
-5
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 130

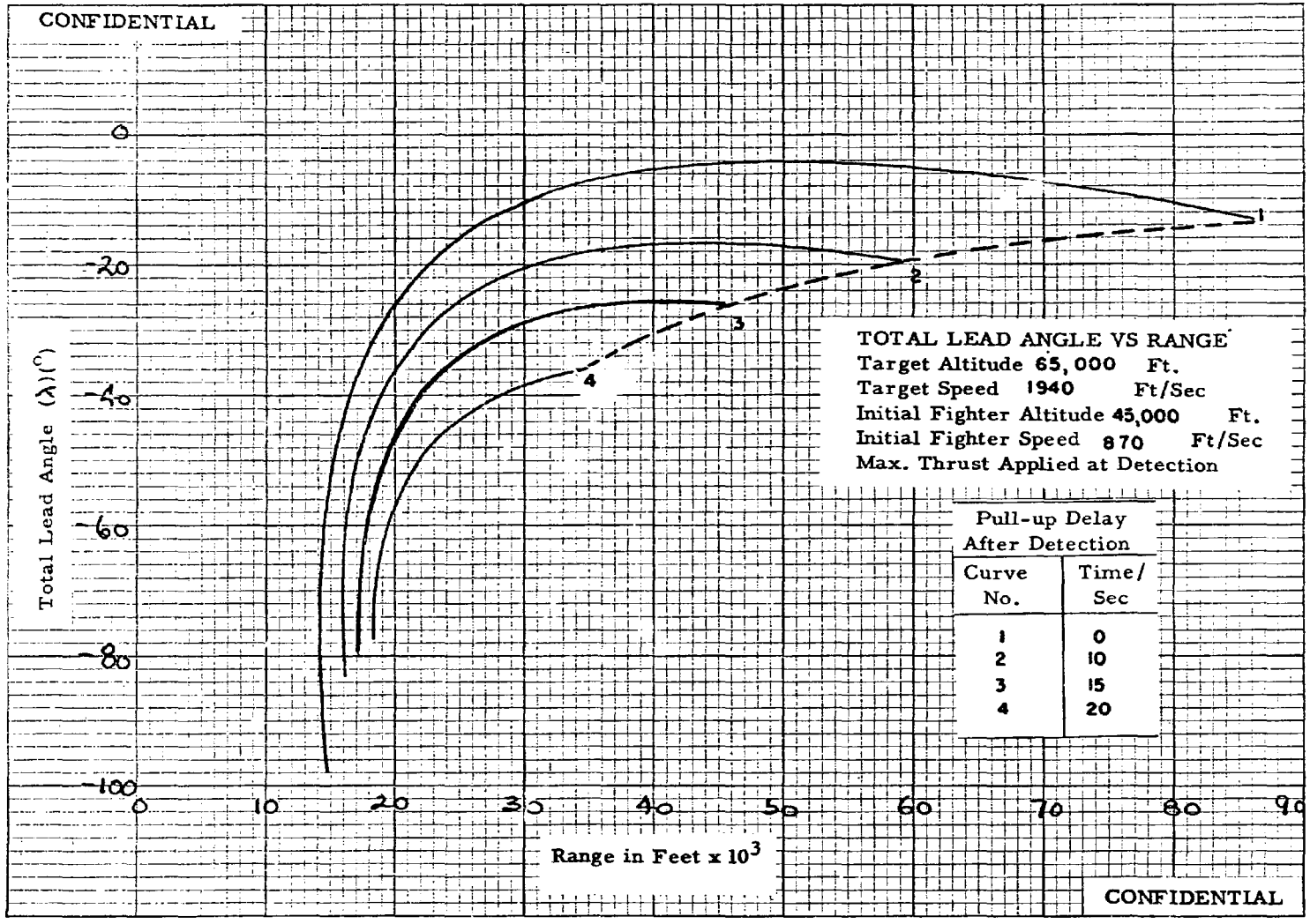
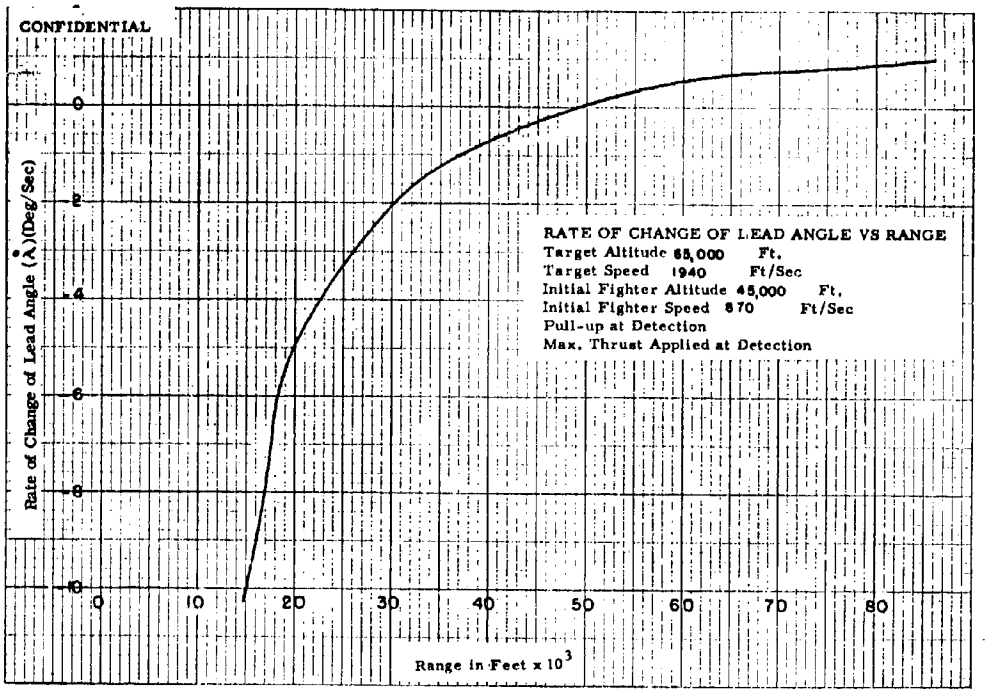

CONFIDENTIAL
Total Lead Angle (λ)(°)
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3
1
2
3
4
TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 15
4 | 20
CONFIDENTIAL

Figure 131


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

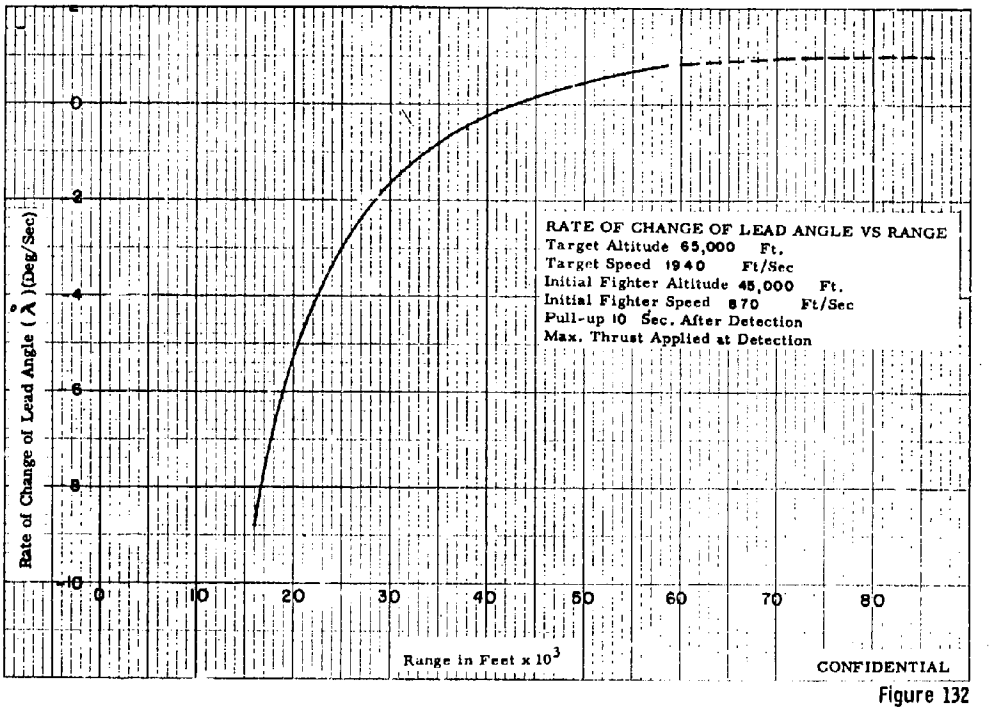
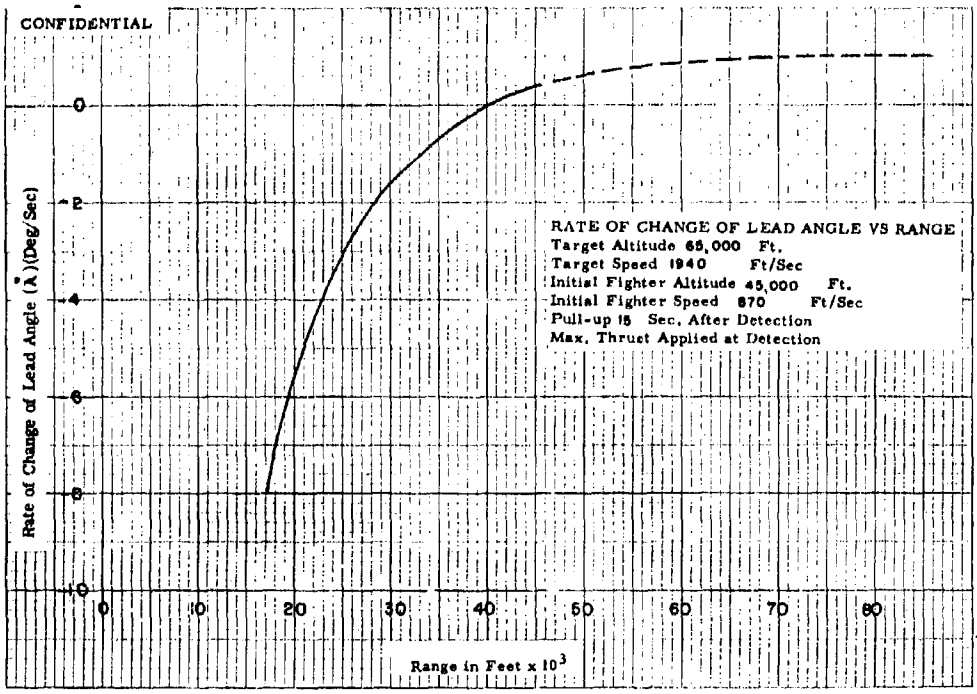

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

Figure 132


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (Ȧ) (Deg/Sec)
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

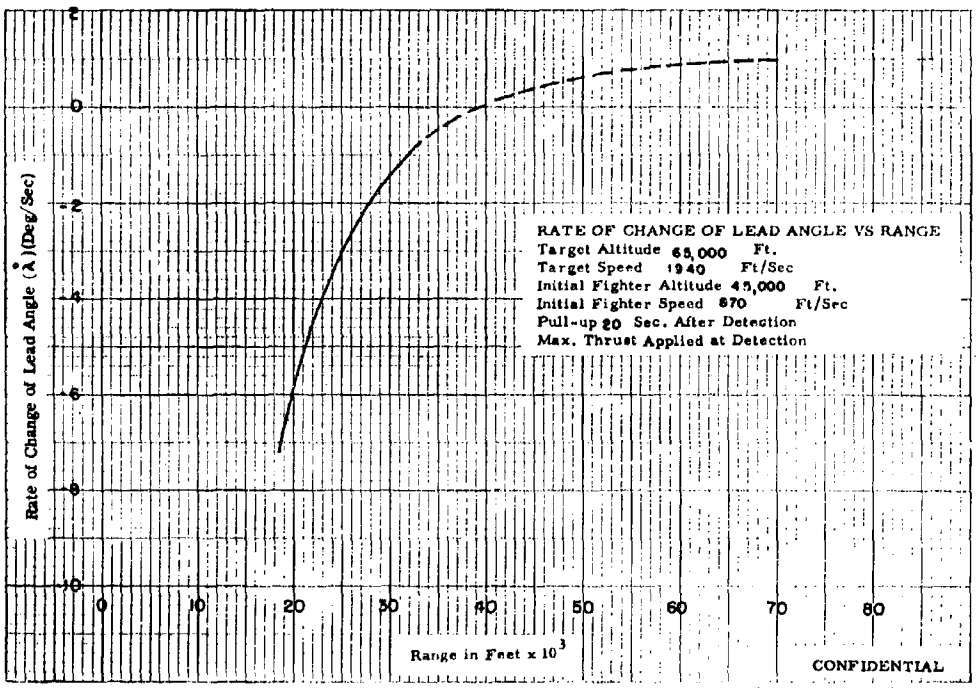
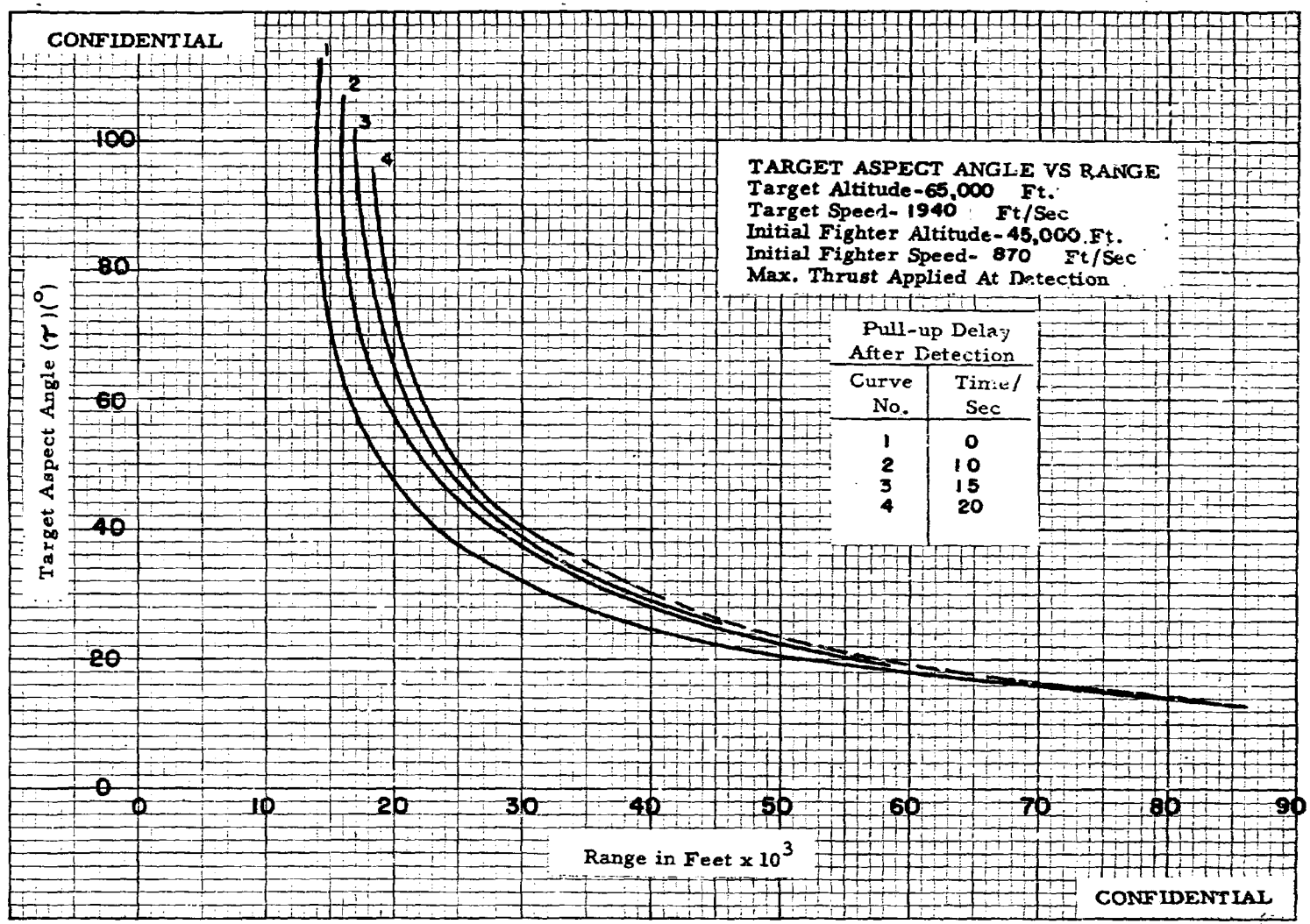
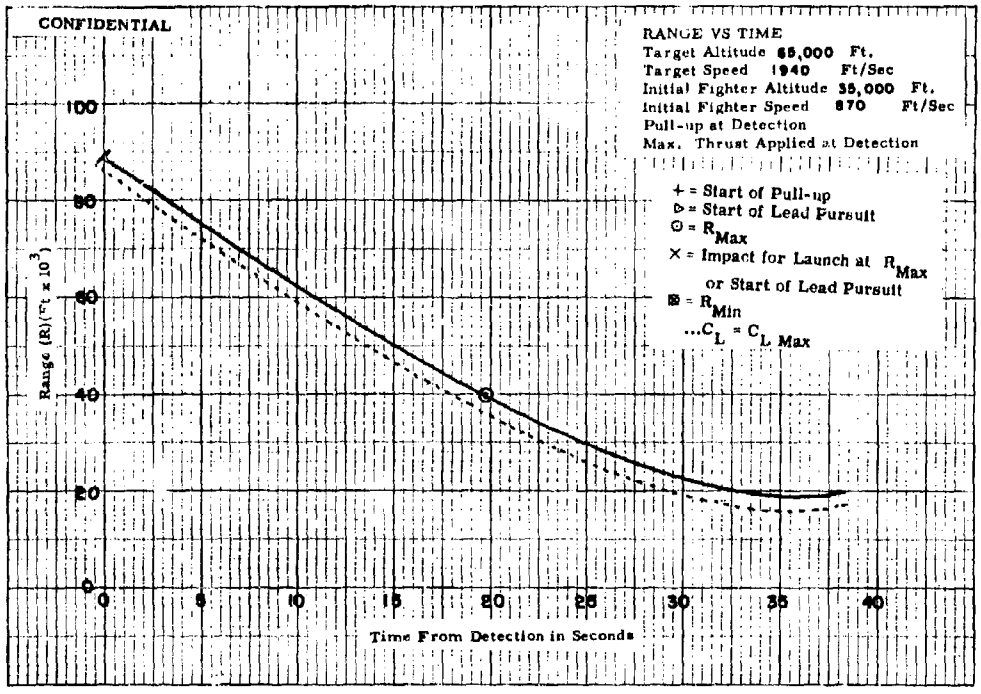

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (Ȧ) (Deg/Sec)
2
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

Figure 133


CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-45,000 Ft.
Initial Fighter Speed- 870 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 15
4 | 20
Target Aspect Angle (γ) (°)
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
Time From Detection in Seconds

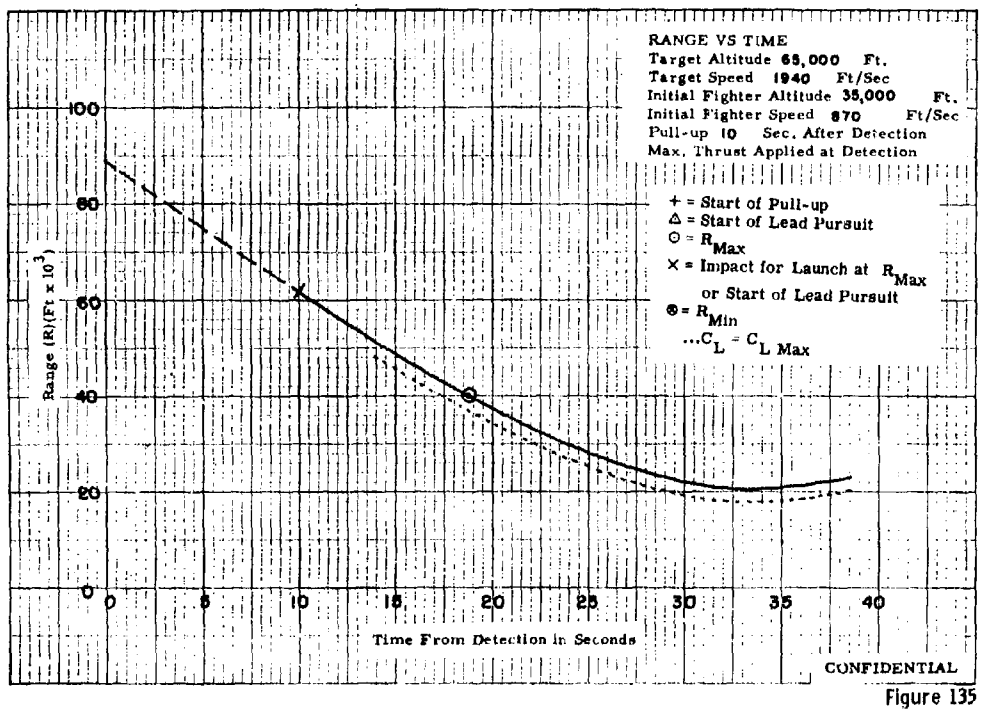
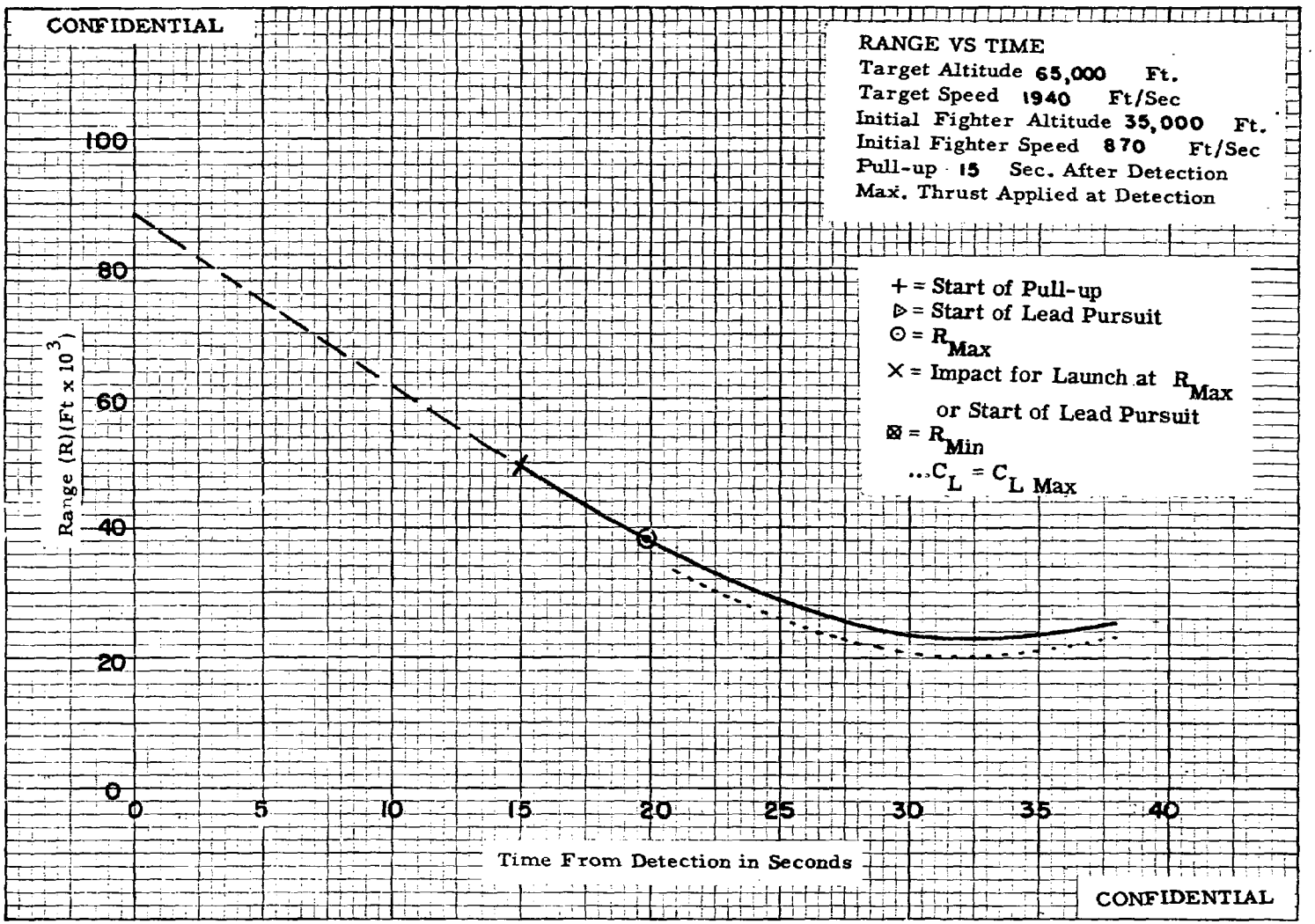
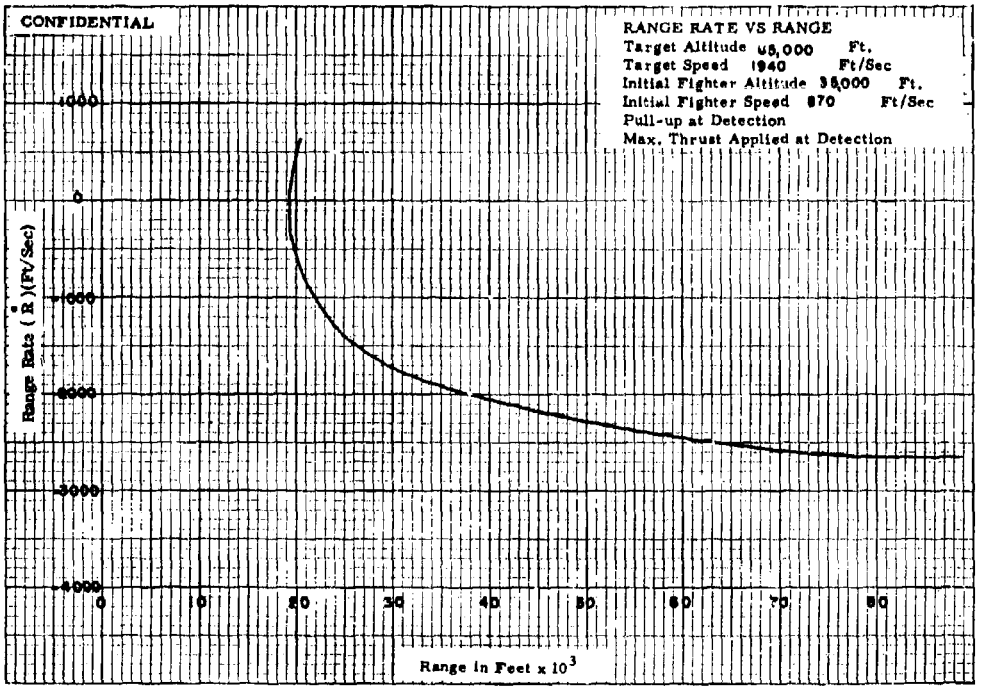

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
Time From Detection in Seconds
CONFIDENTIAL

Figure 135


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
Time From Detection in Seconds
CONFIDENTIAL

K&E 10 X 10 TO THE INCH 359-500



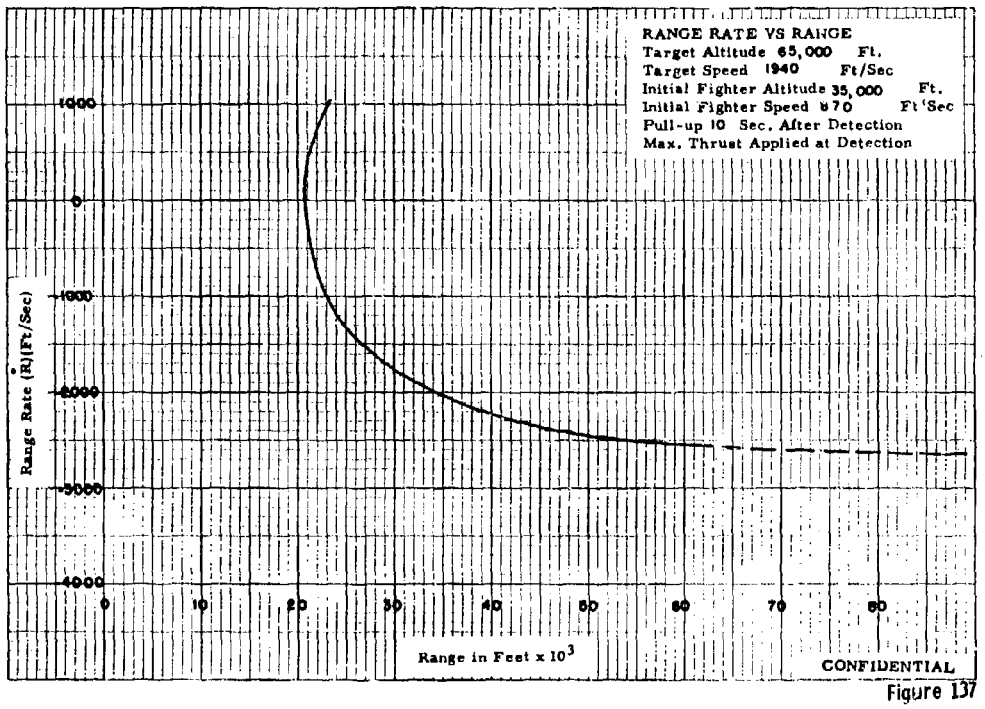


Figure 137

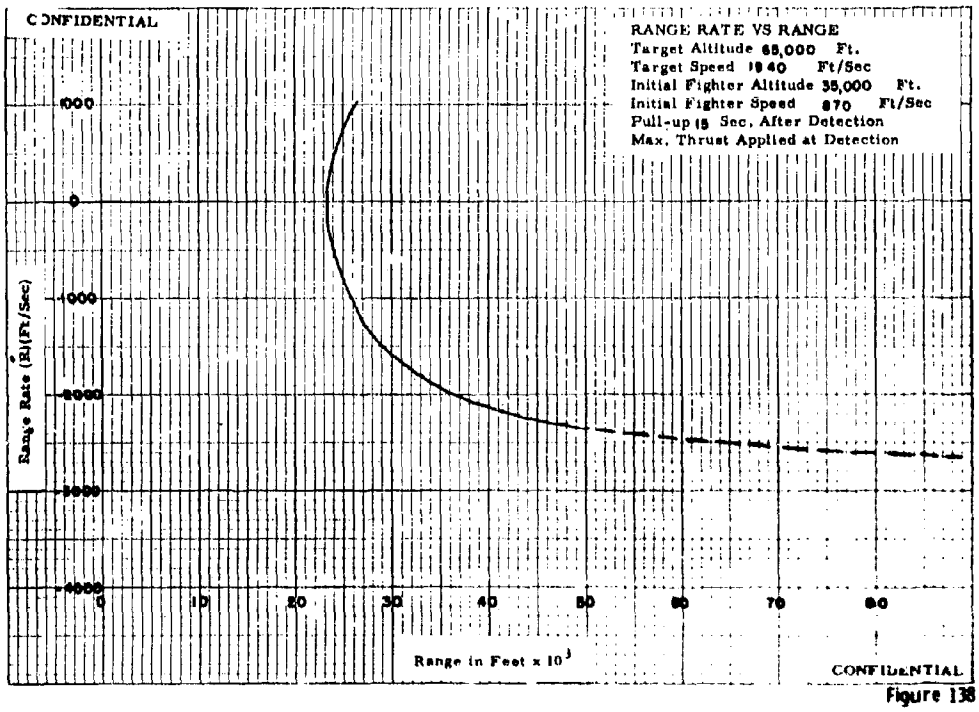


Figure 138

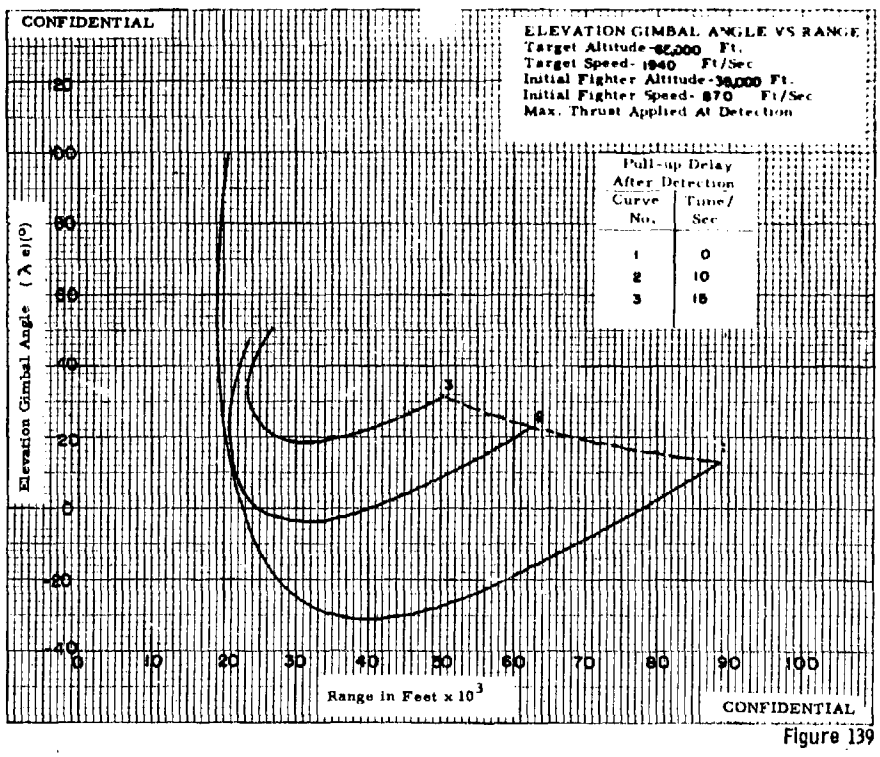


Figure 139

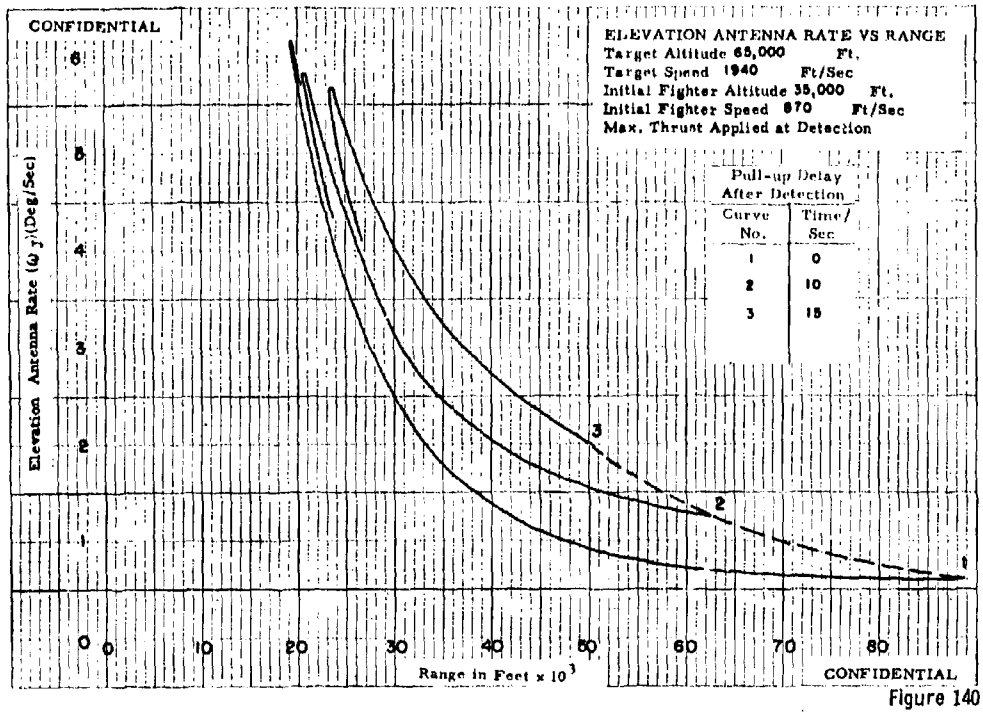


Figure 140

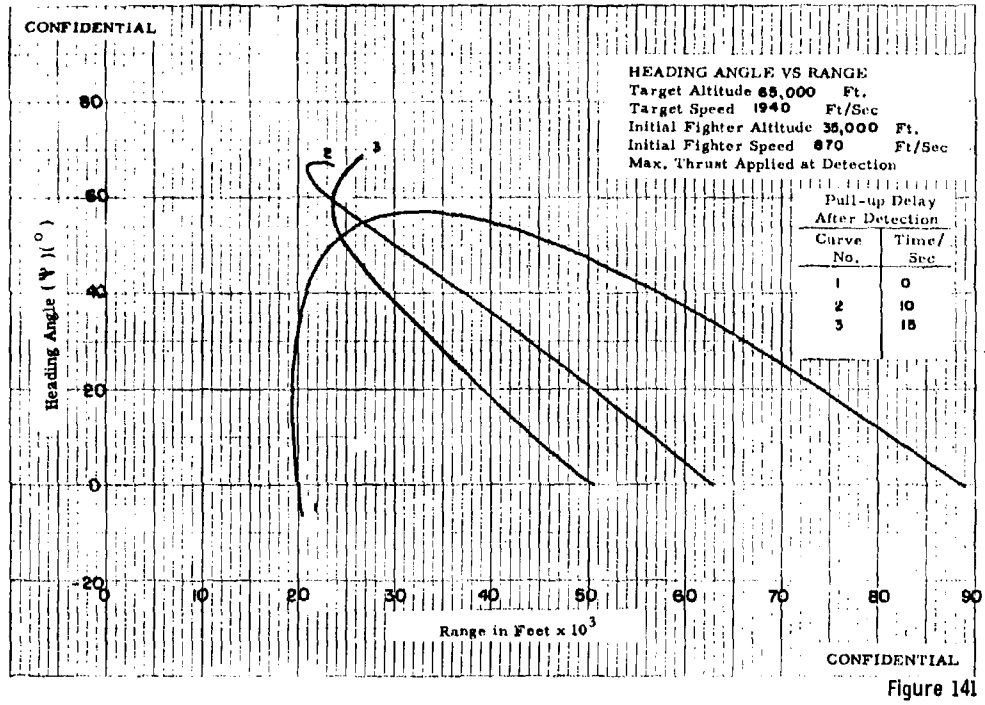
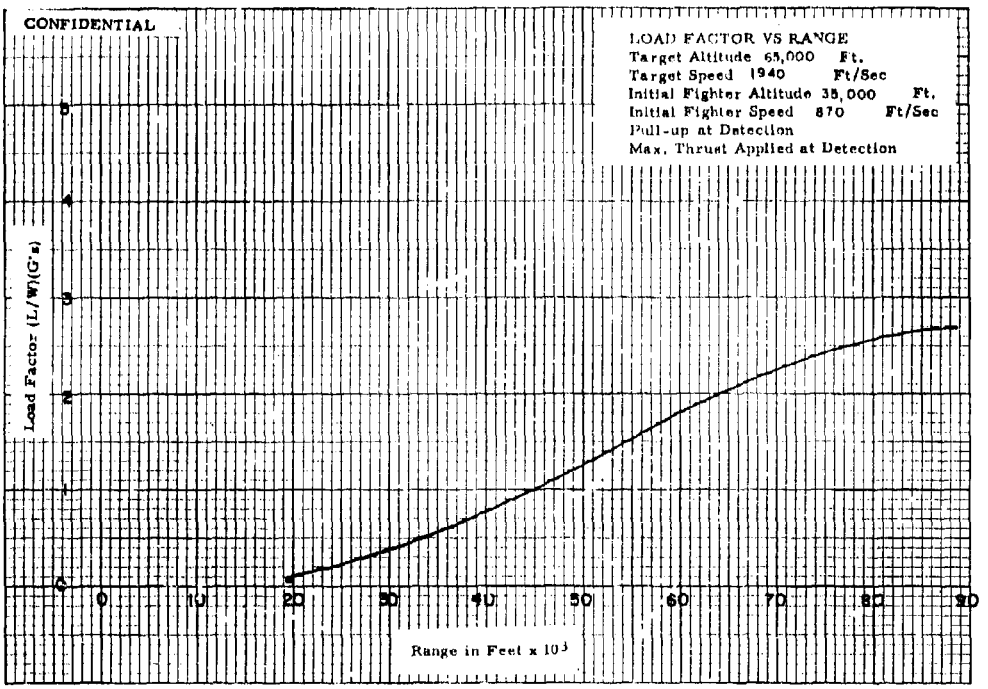


Figure 141


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

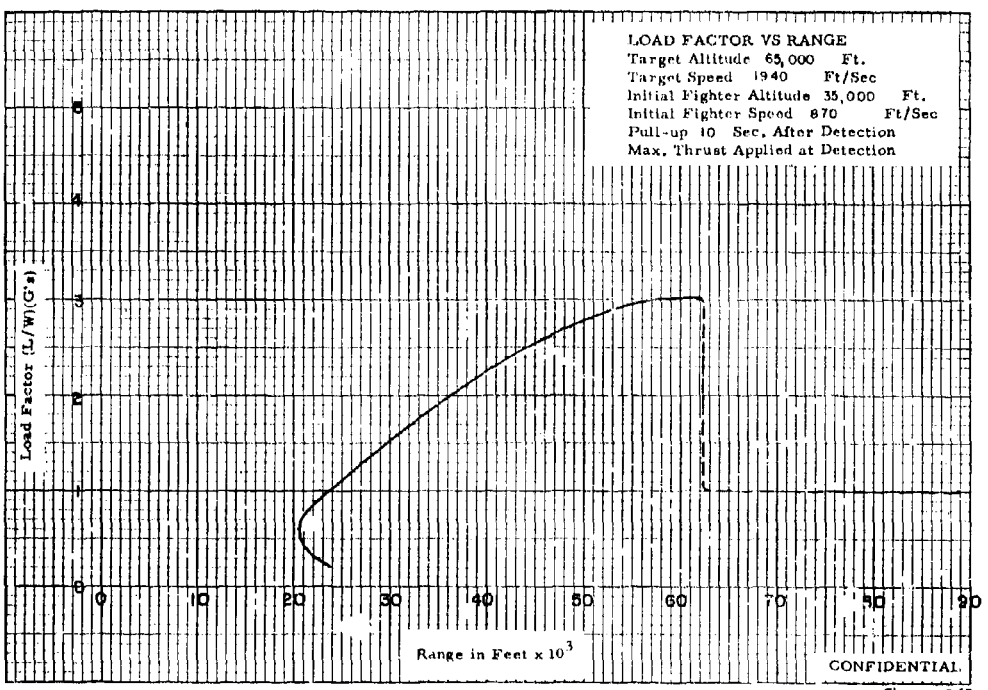

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

Figure 142

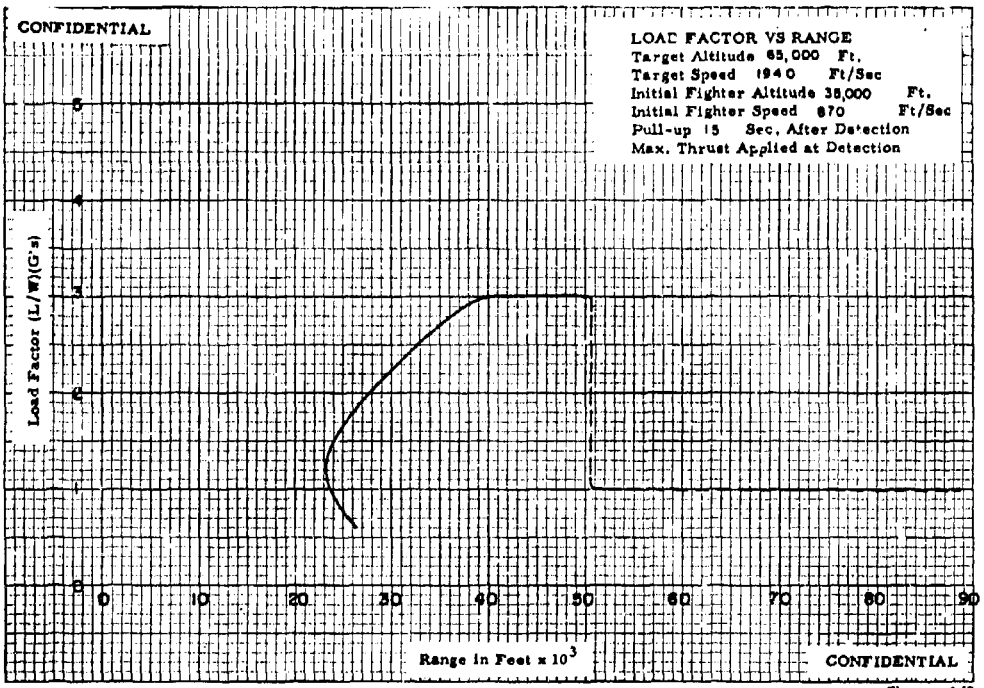


Figure 143

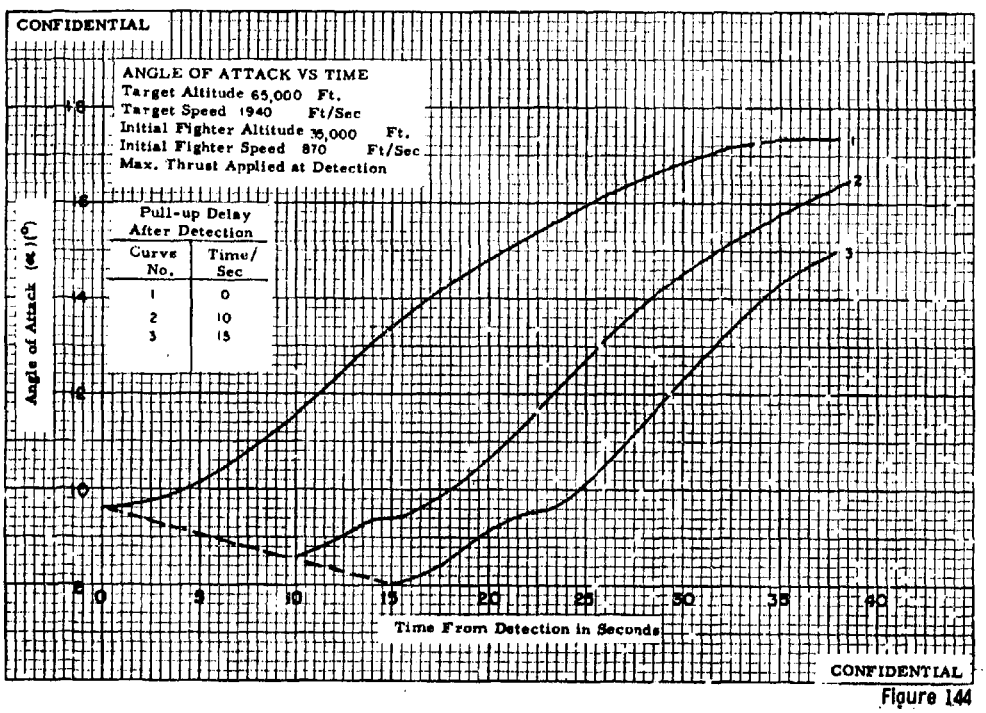


Figure 144

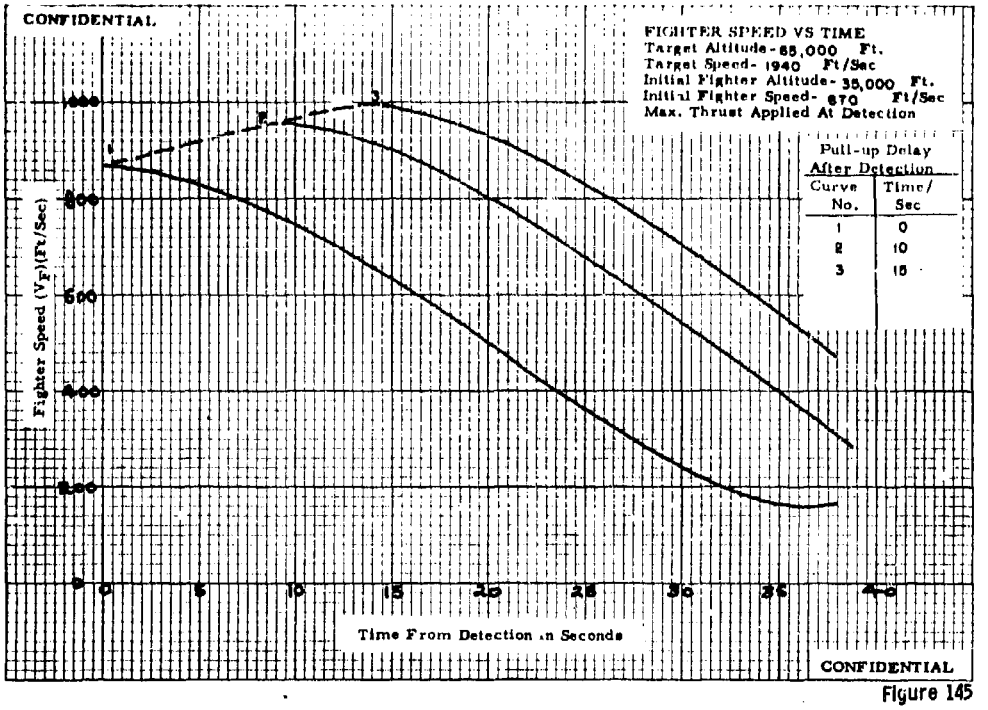


Figure 145

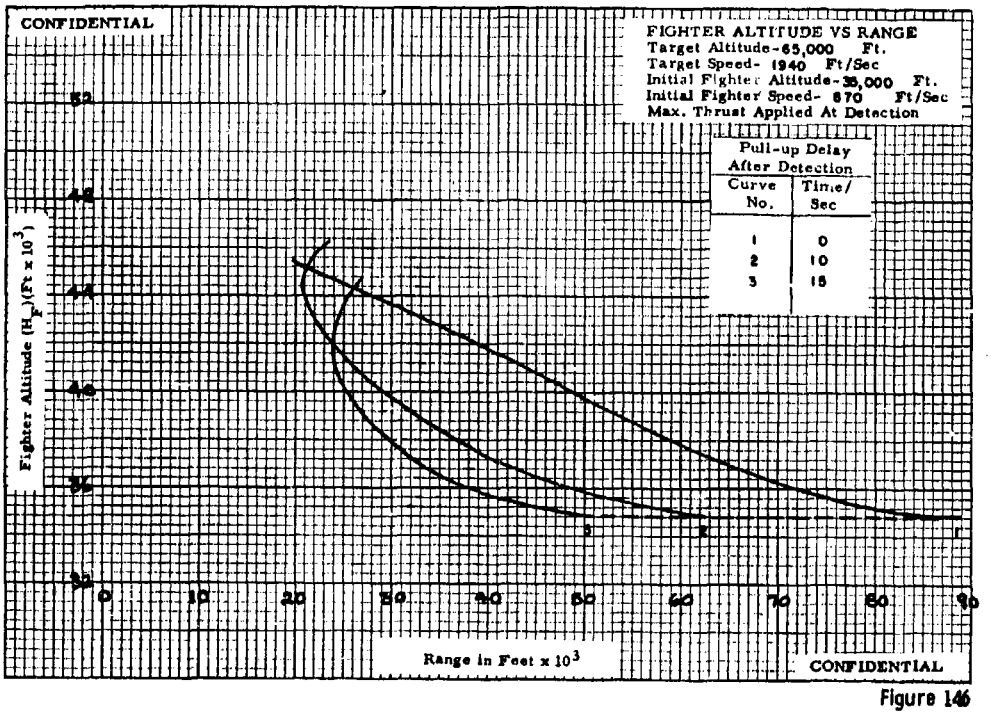
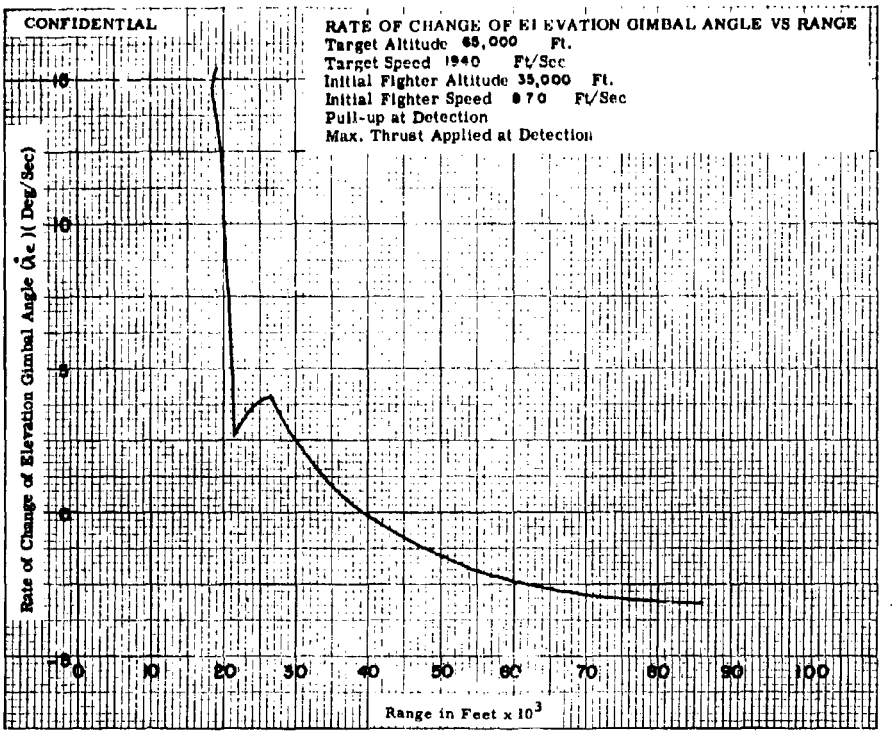


Figure 146


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (Ȧe)(Deg/Sec)
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

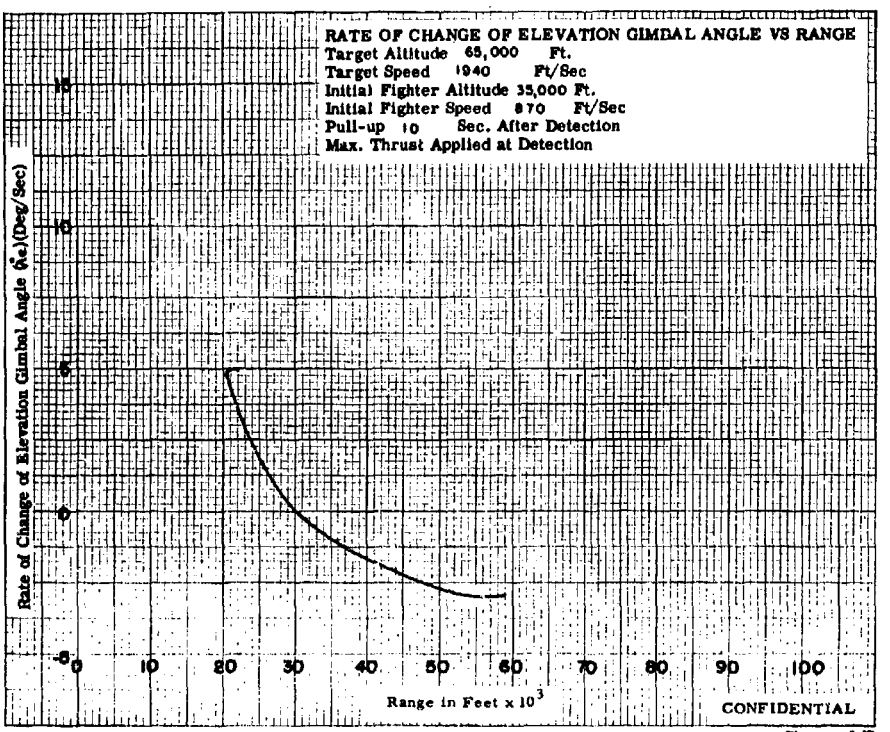

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (Ȧe)(Deg/Sec)
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 147

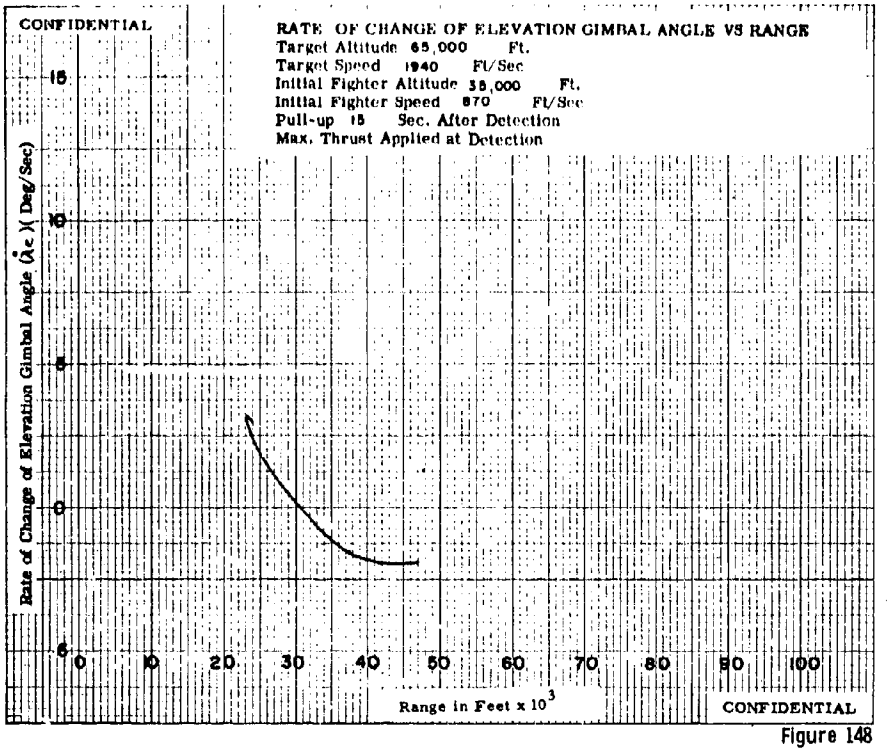


Figure 148

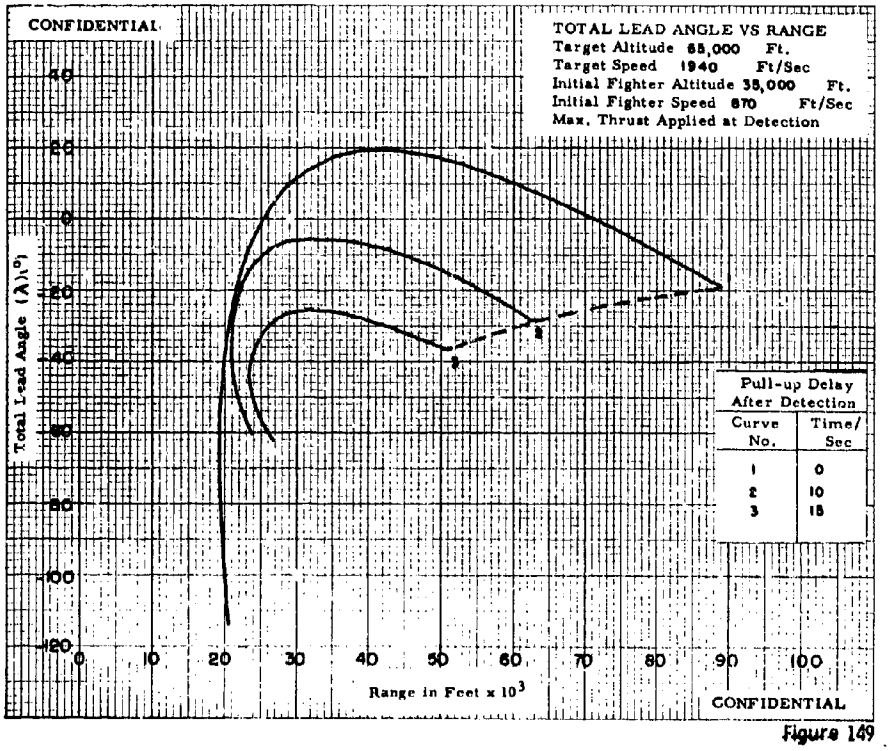
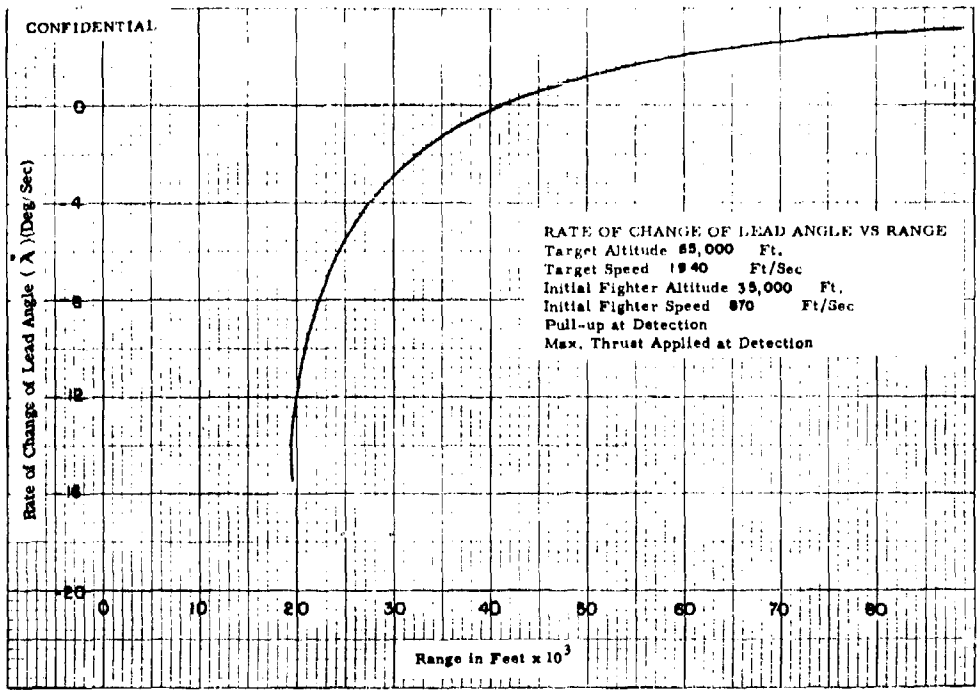


Figure 149


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle ($\dot{\lambda}$) (Deg/Sec)
0
-4
-8
-12
-16
-20
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

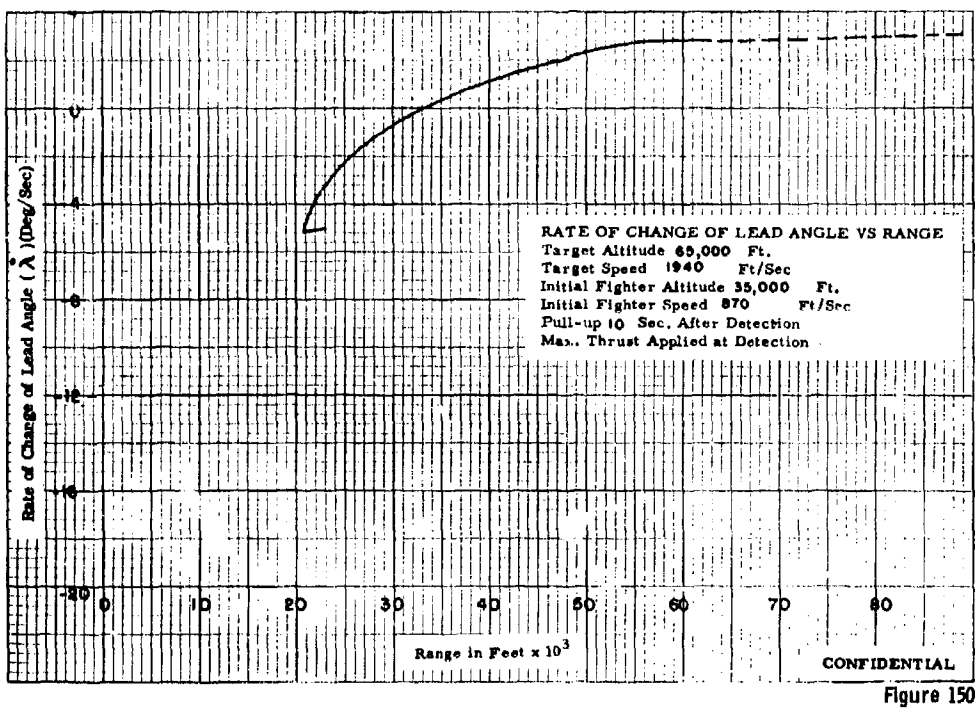

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle ($\dot{\lambda}$) (Deg/Sec)
0
-4
-8
-12
-16
-20
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 150

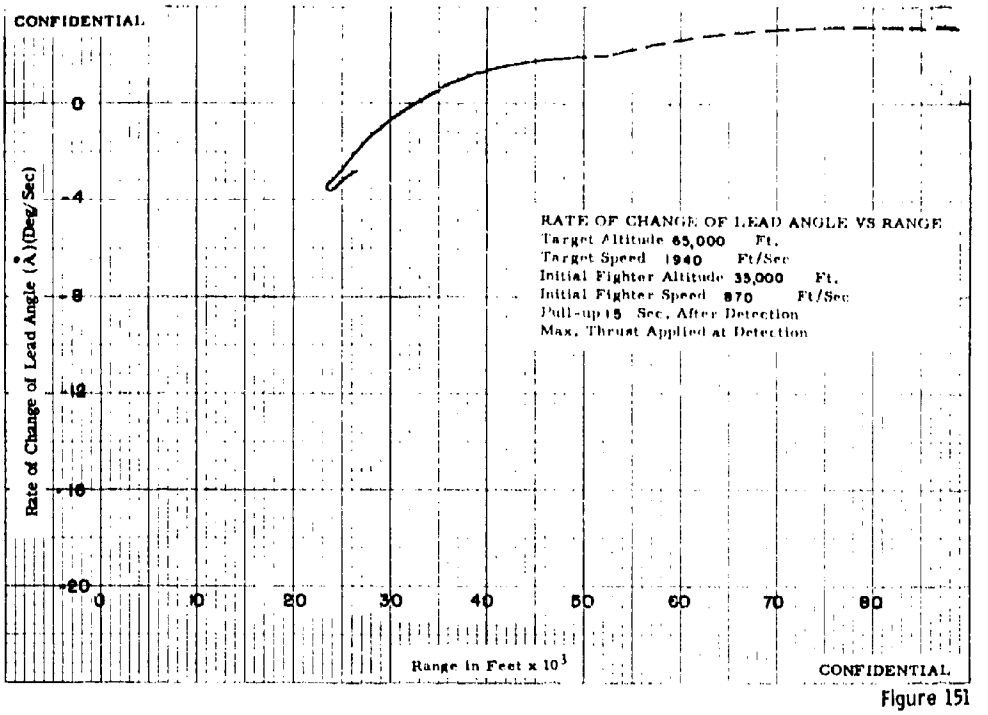


Figure 151

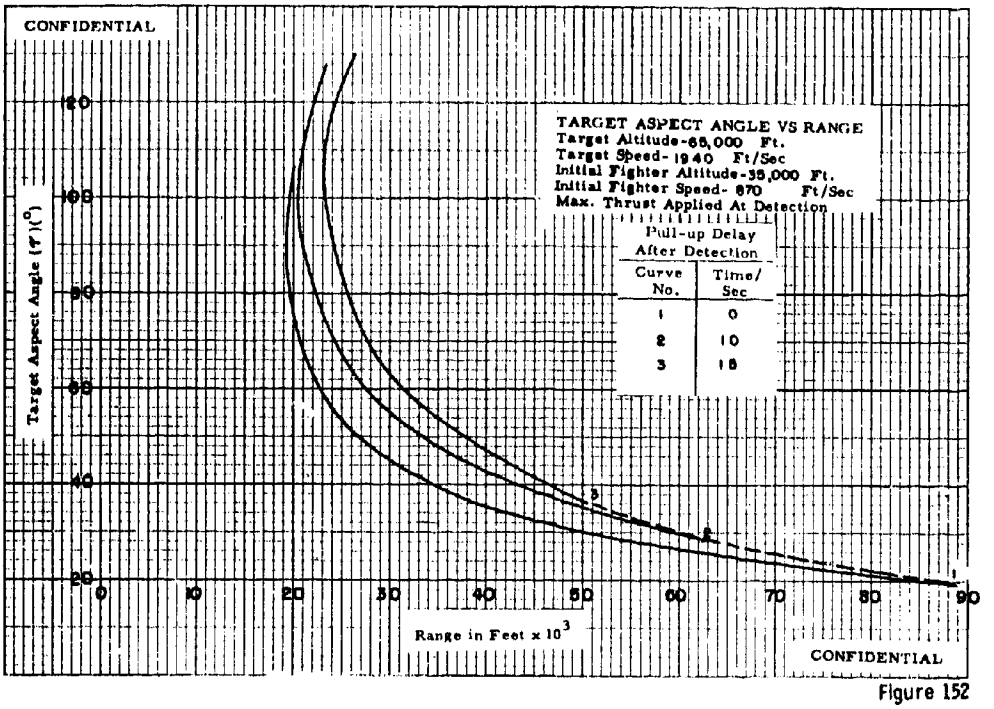
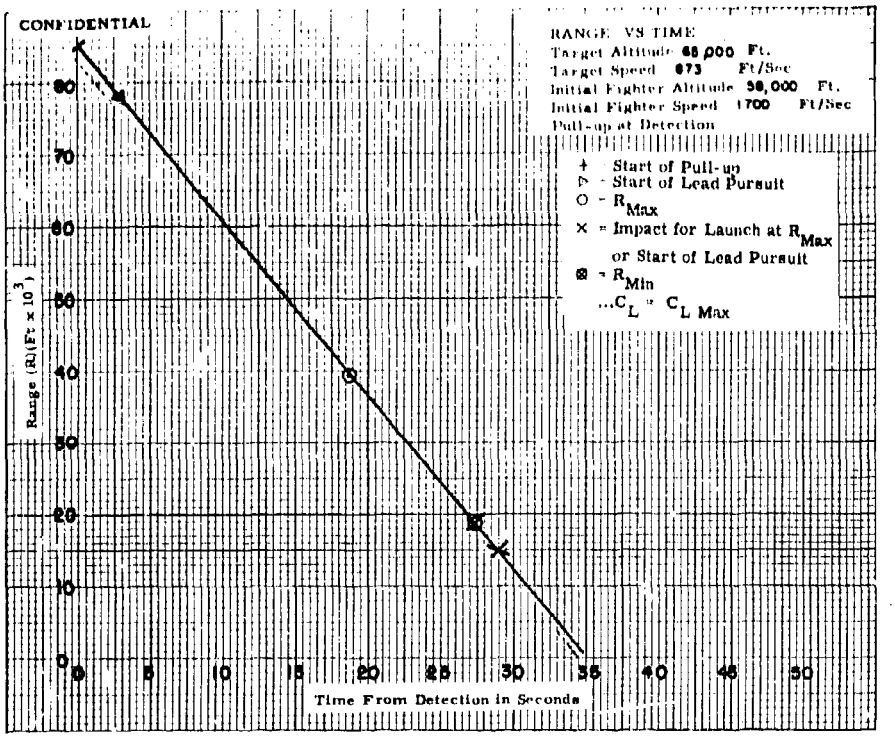


Figure 152


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up at Detection
+ Start of Pull-up
▷ Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

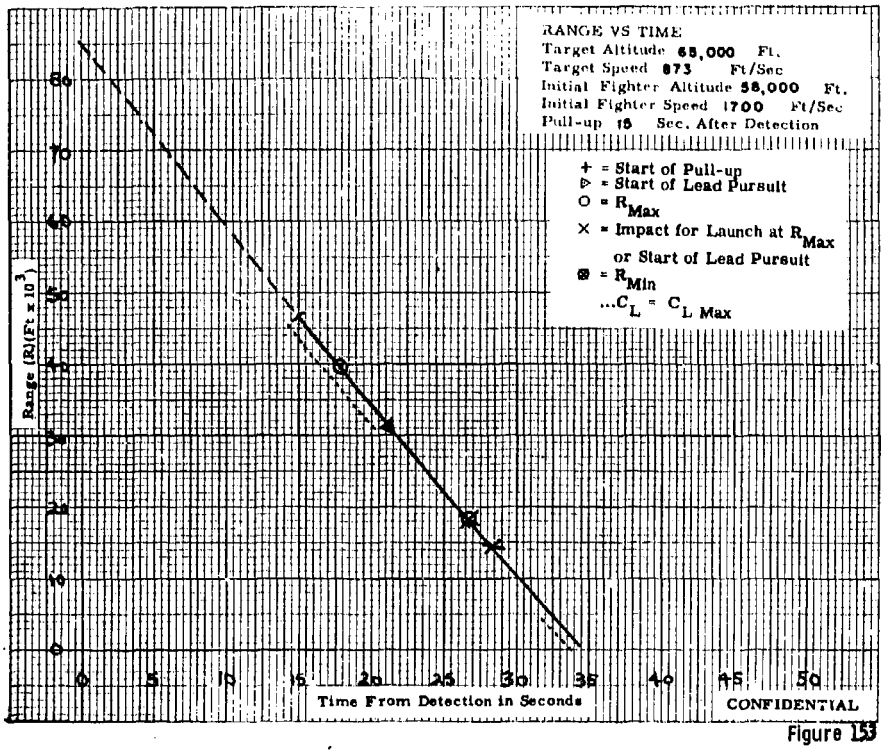
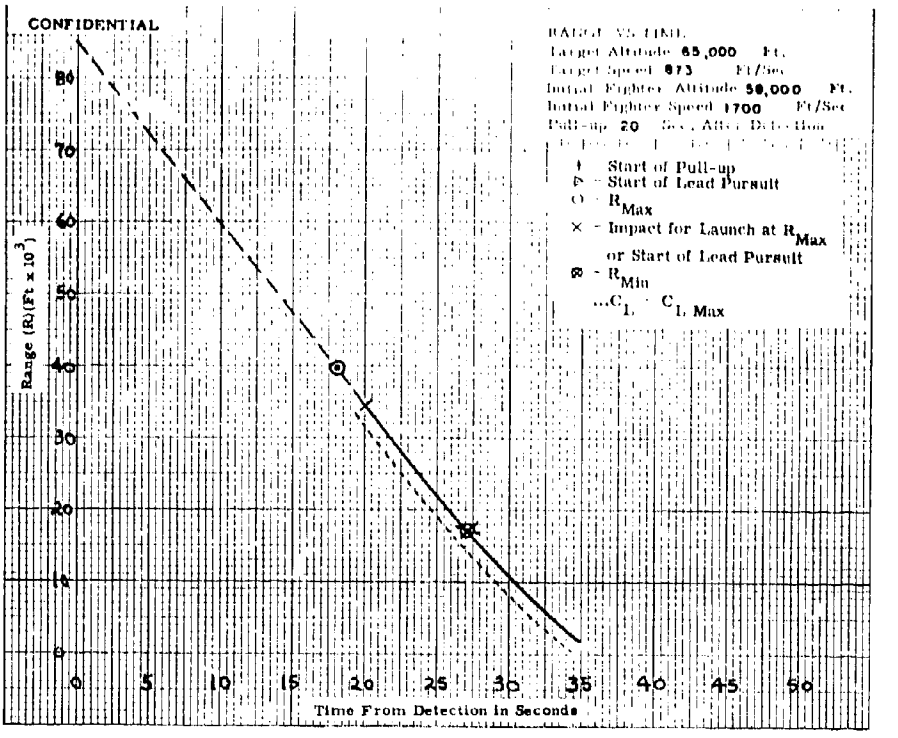

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 153


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 20 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

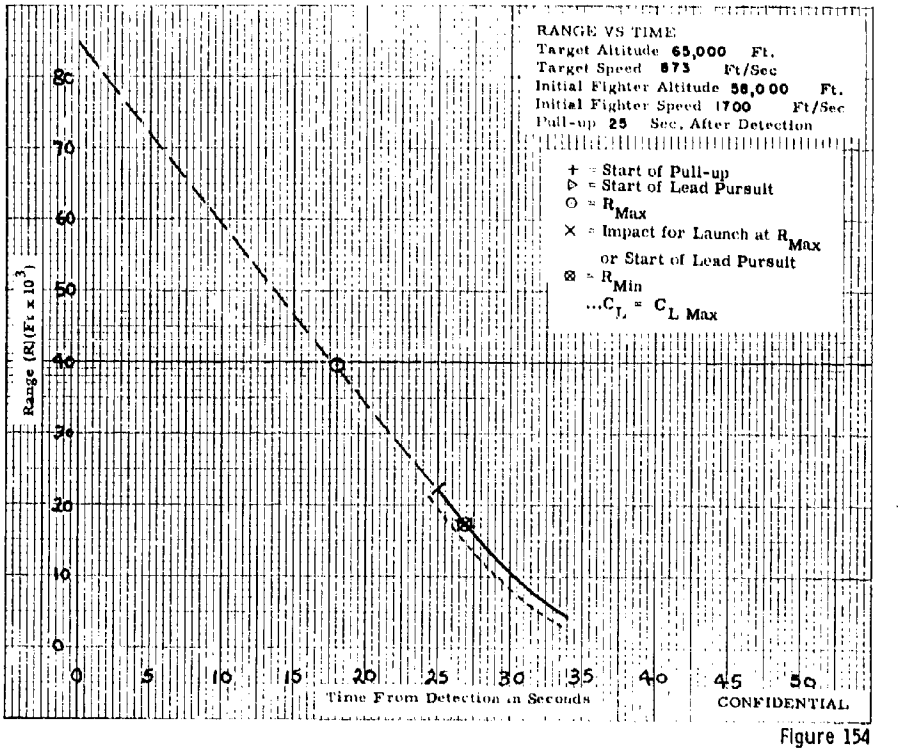
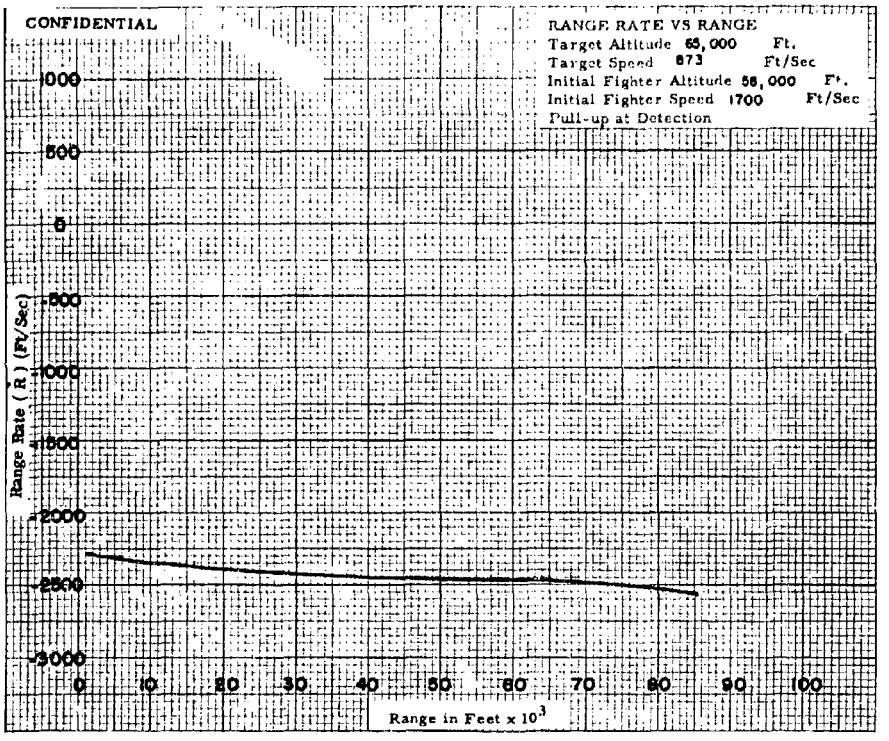

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 25 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 154


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

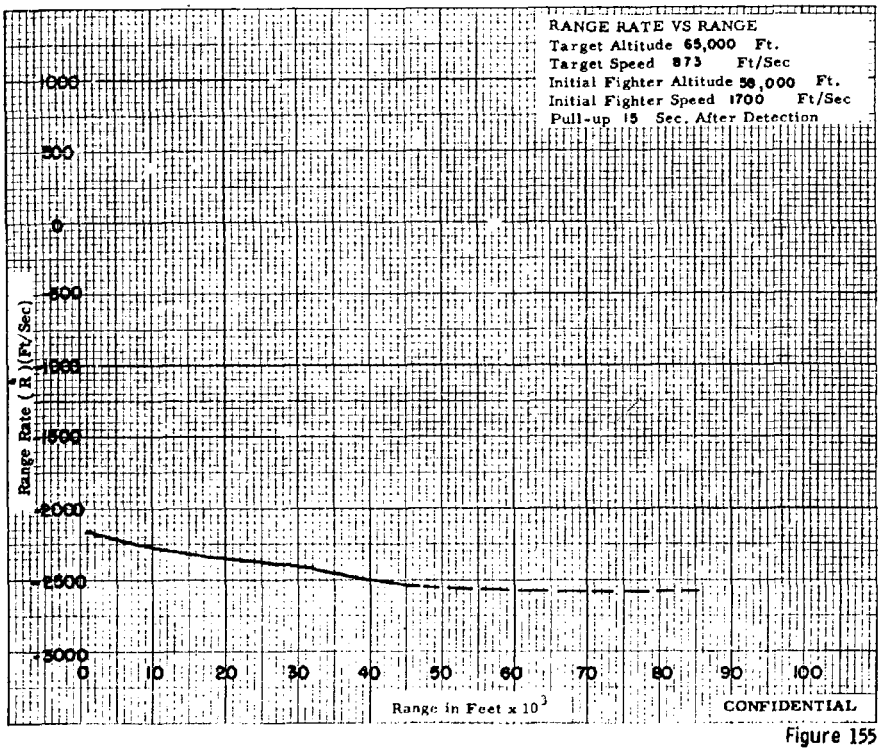
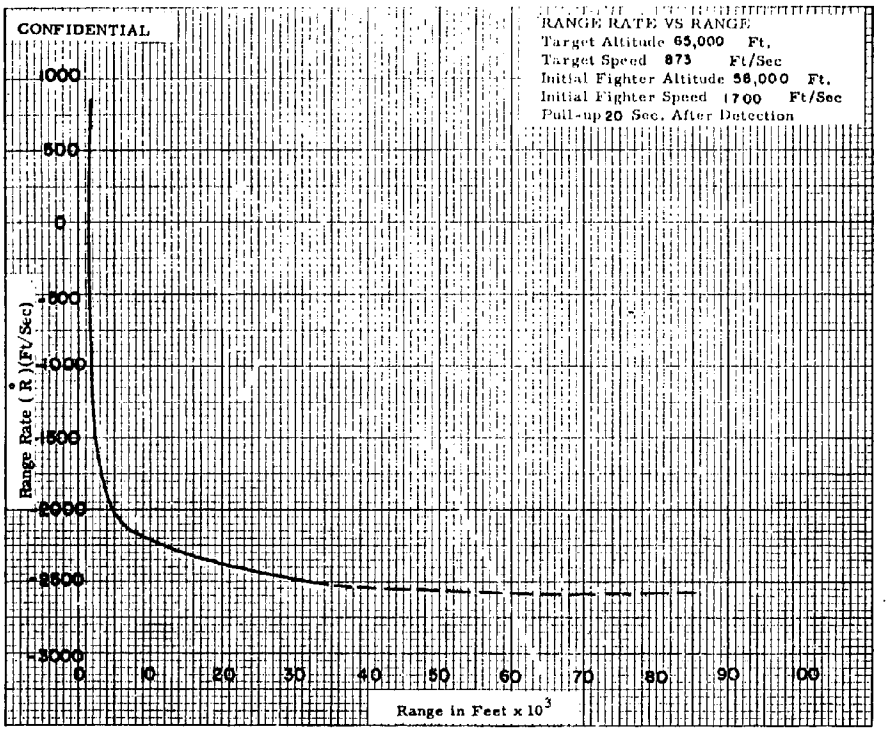

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 15 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 155


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 20 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

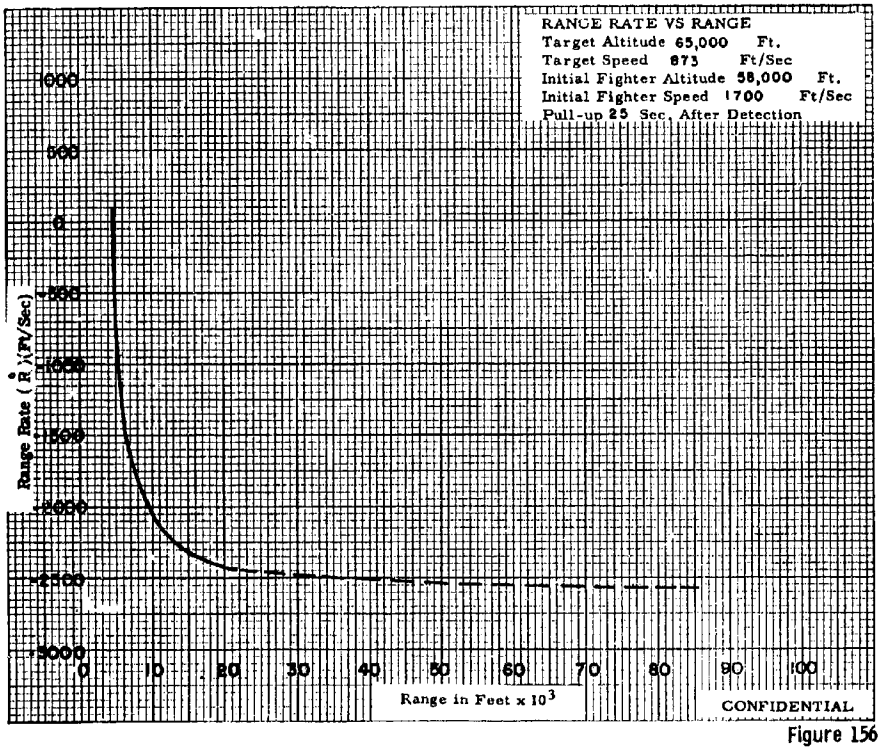
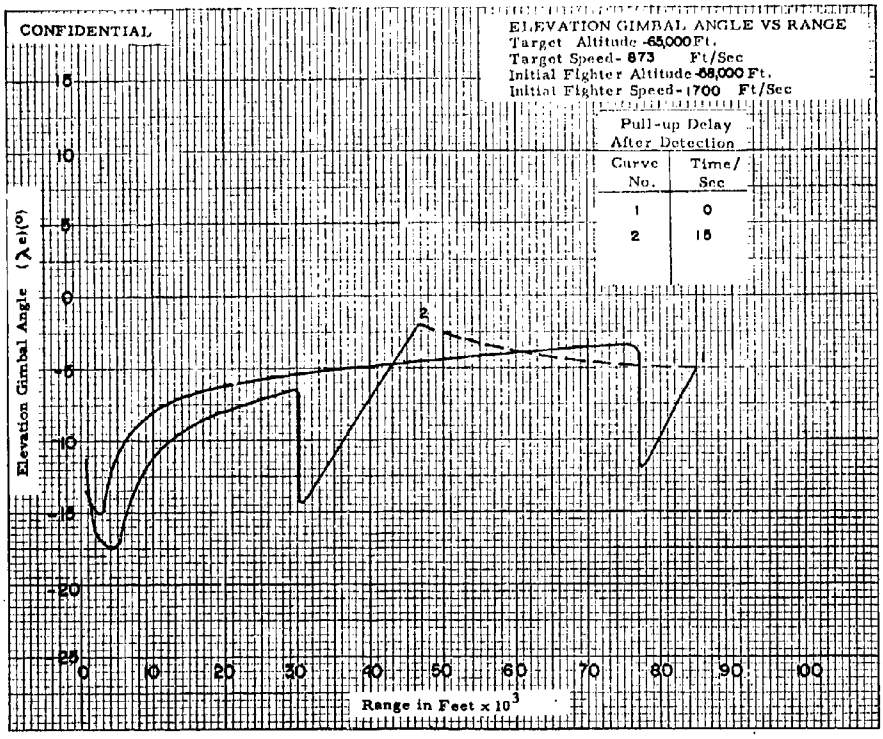

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 25 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 156


CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed-1700 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 15
Elevation Gimbal Angle (λ e)(°)
15
10
5
0
-5
-10
-15
-20
-25
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
2
1

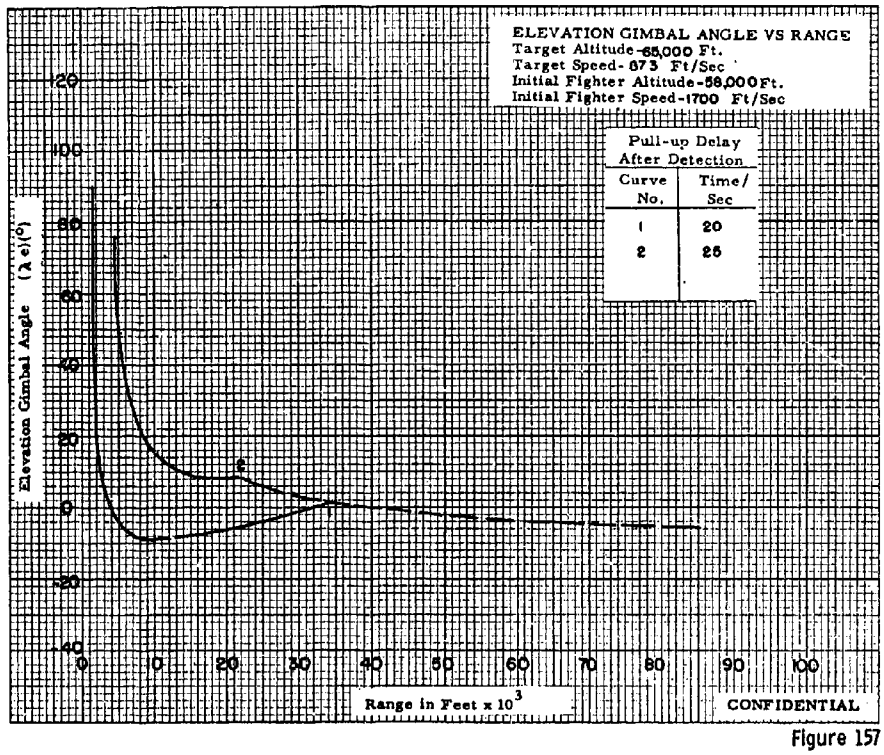
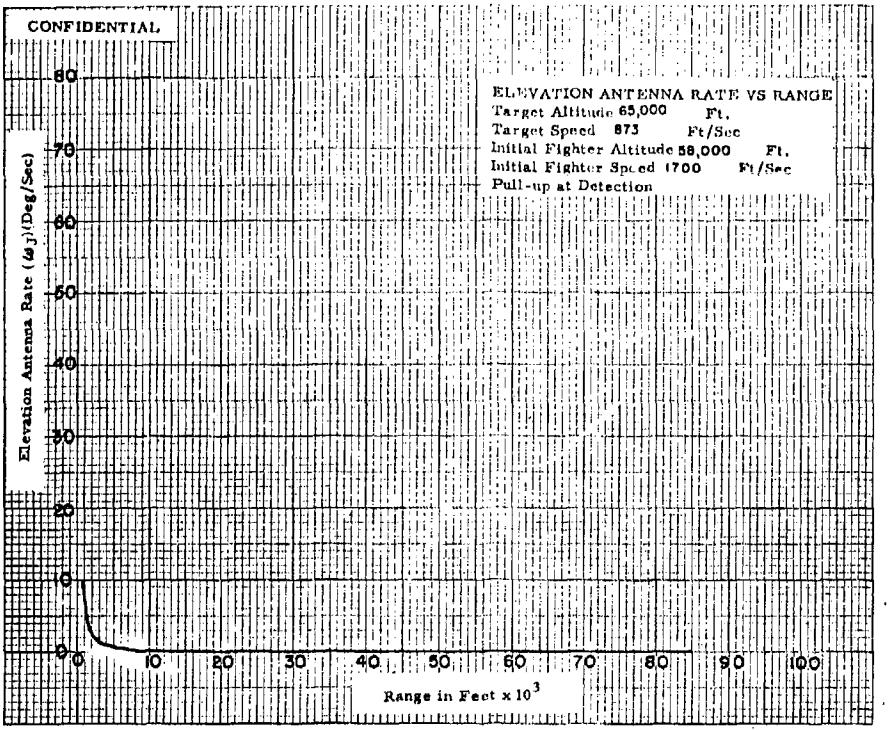

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed-1700 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 20
2 | 25
Elevation Gimbal Angle (λ e)(°)
120
100
80
60
40
20
0
-20
-40
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL
2
1

Figure 157


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up at Detection
Elevation Antenna Rate (ω_J)(Deg/Sec)
Range in Feet x 10^3

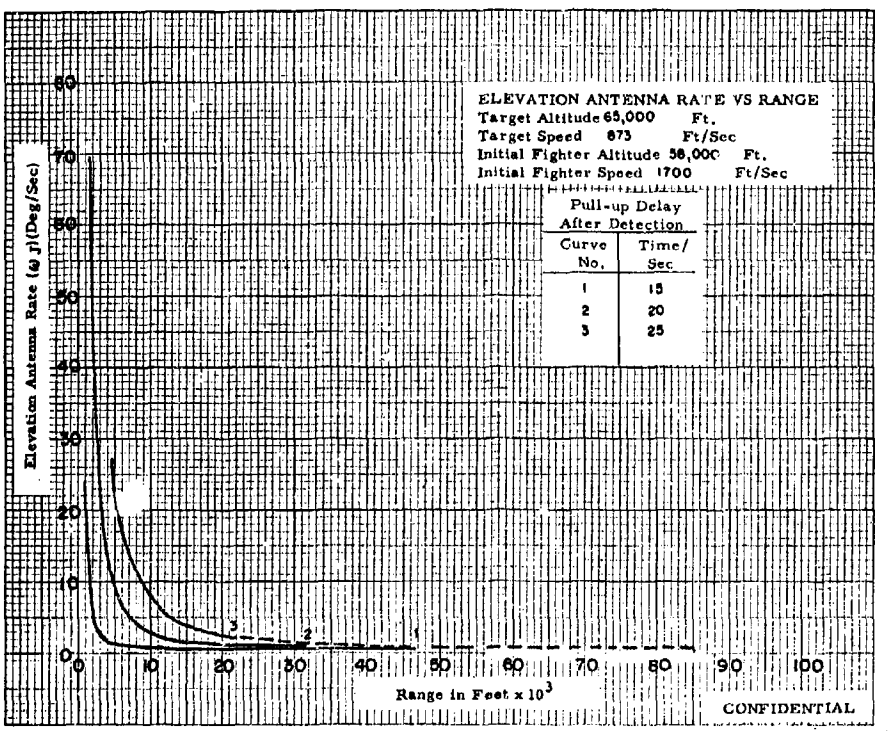

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 15
2 | 20
3 | 25
Elevation Antenna Rate (ω_J)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 158

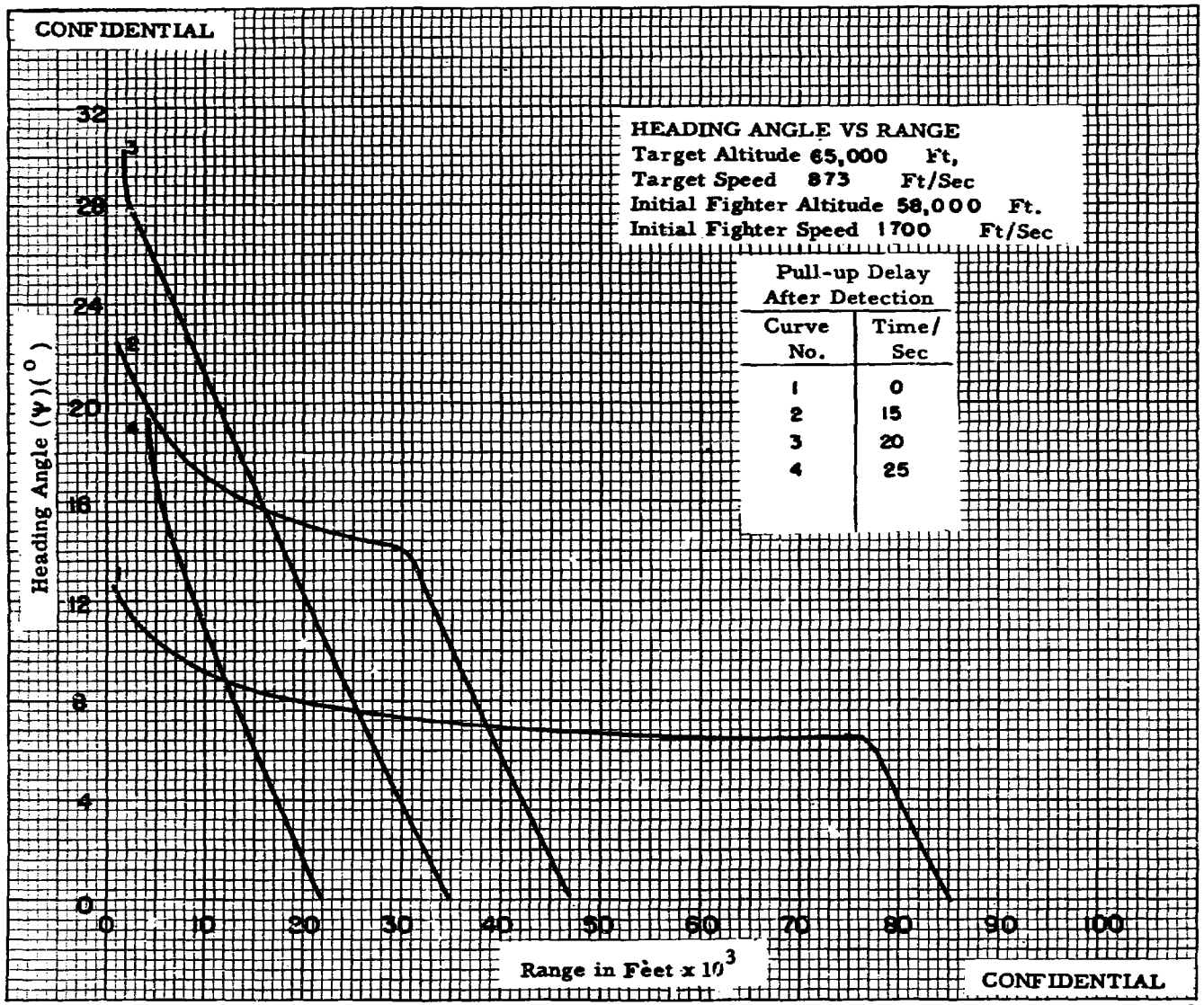
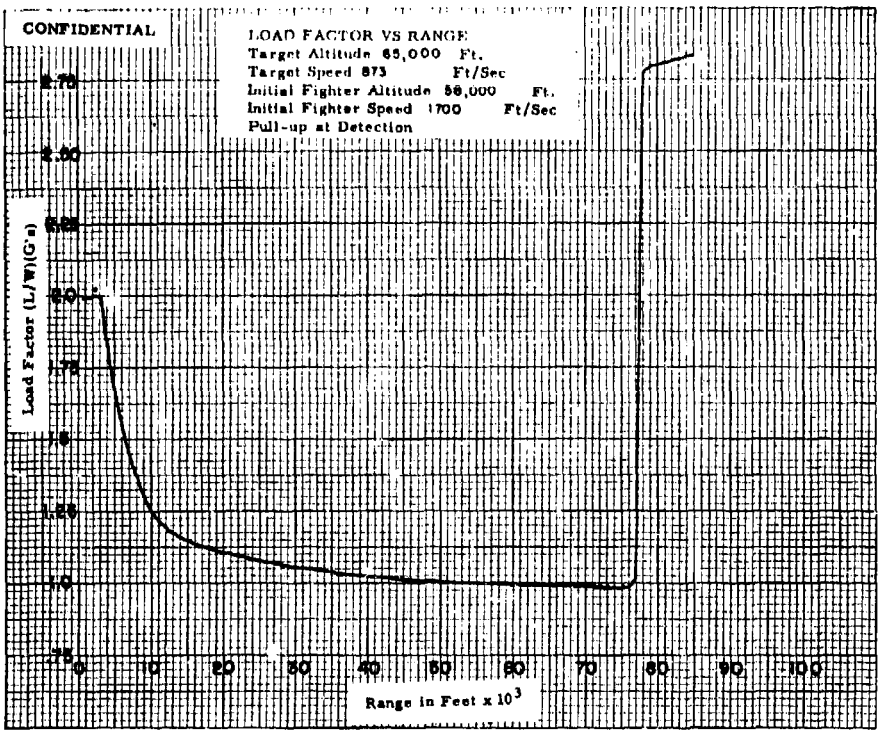

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft,
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 15
3 | 20
4 | 25
Heading Angle (Ψ)(°)
32
28
24
20
16
12
8
4
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 159


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

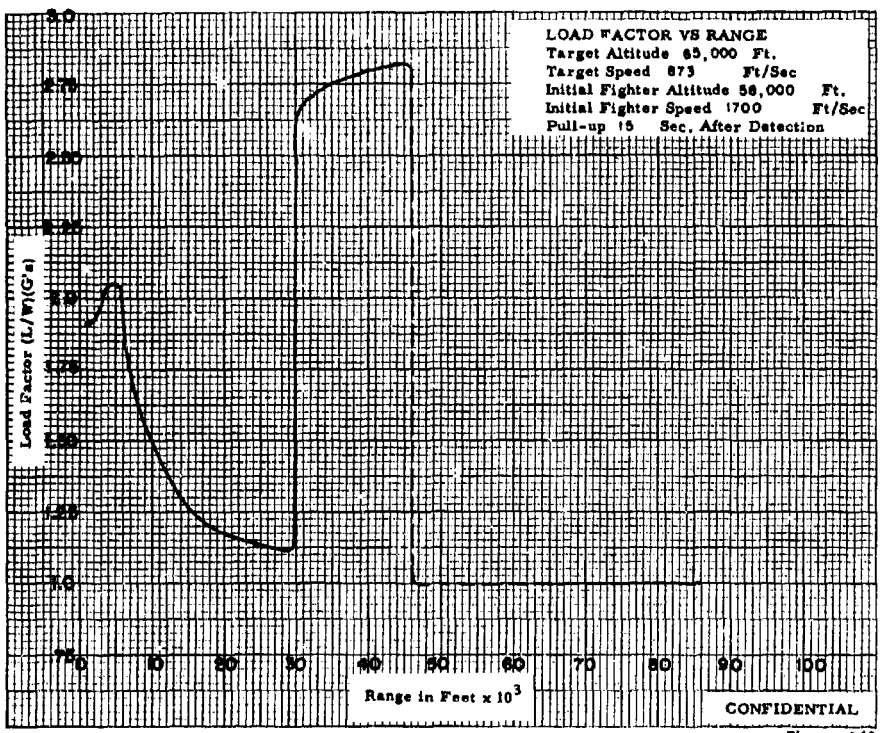
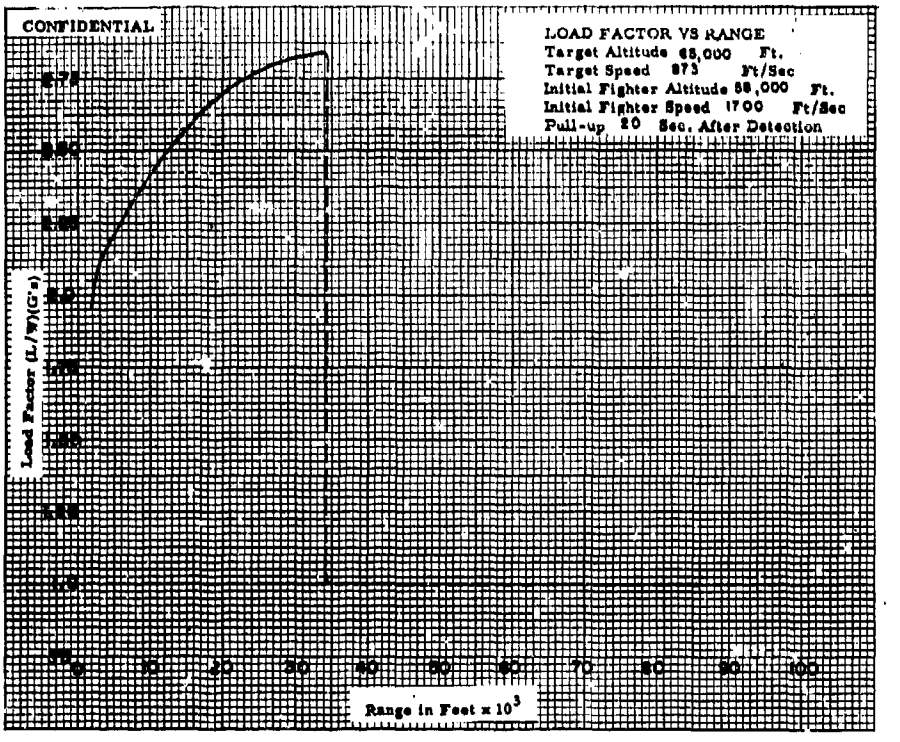

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 15 Sec. After Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

Figure 160


LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 20 Sec. After Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

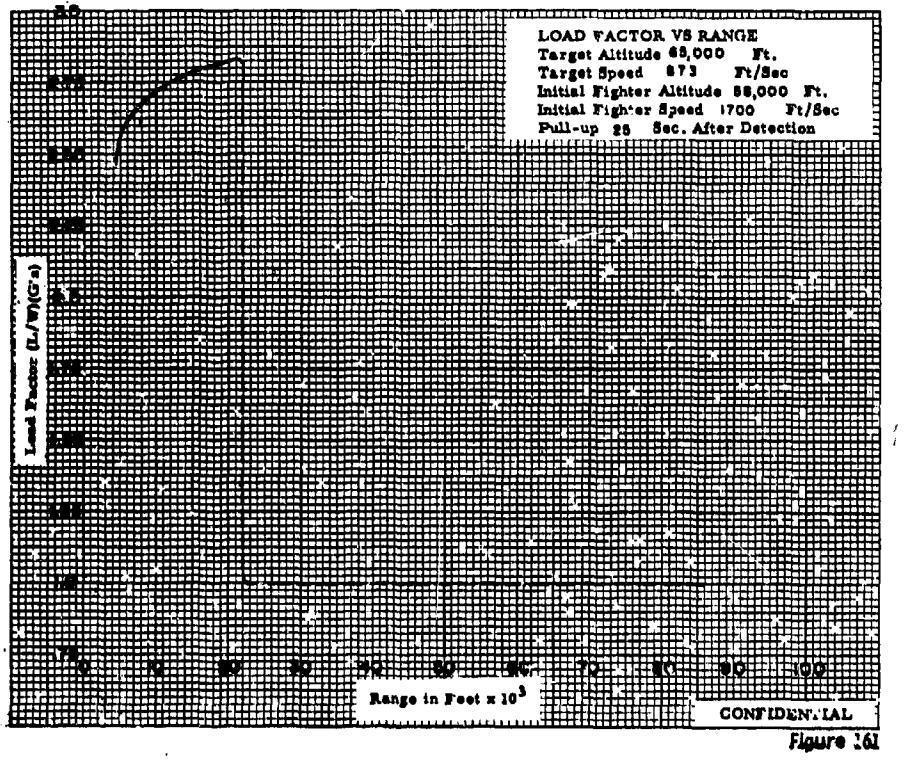

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 25 Sec. After Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

Figure 161

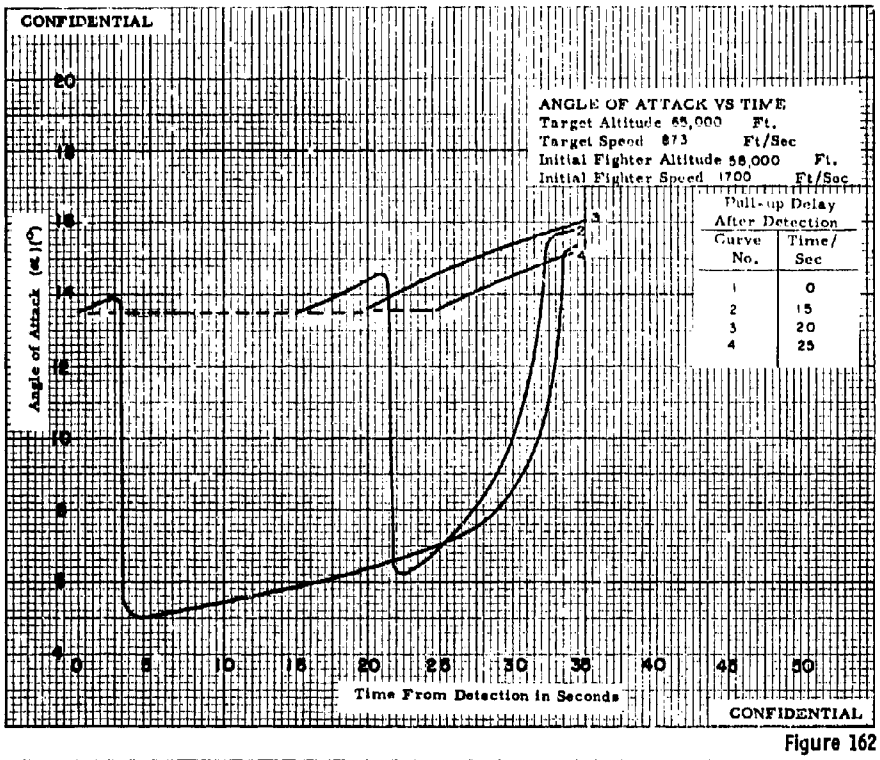


Figure 162

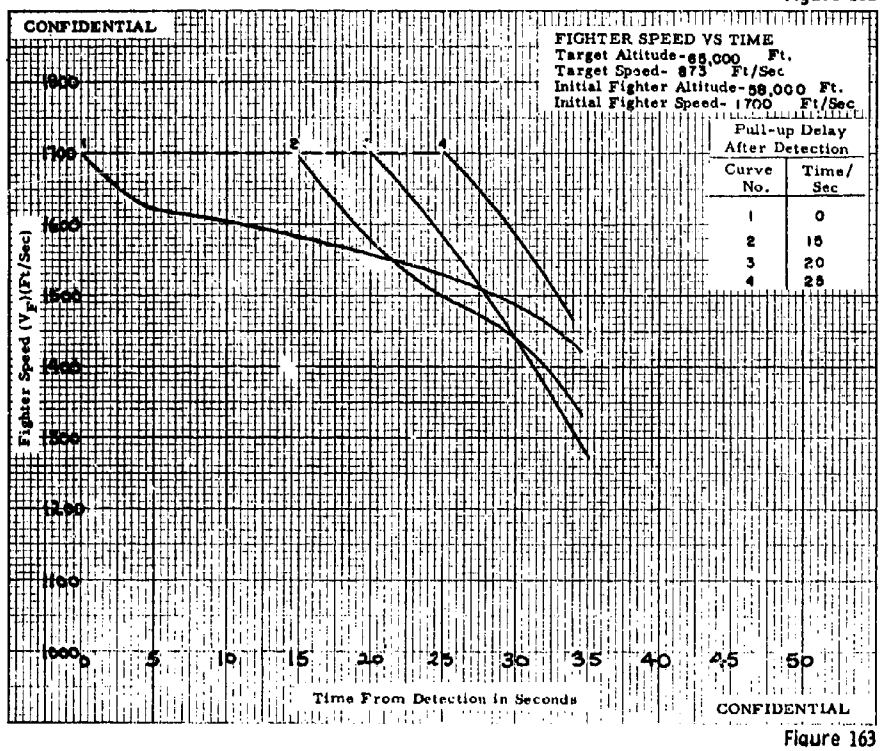


Figure 163

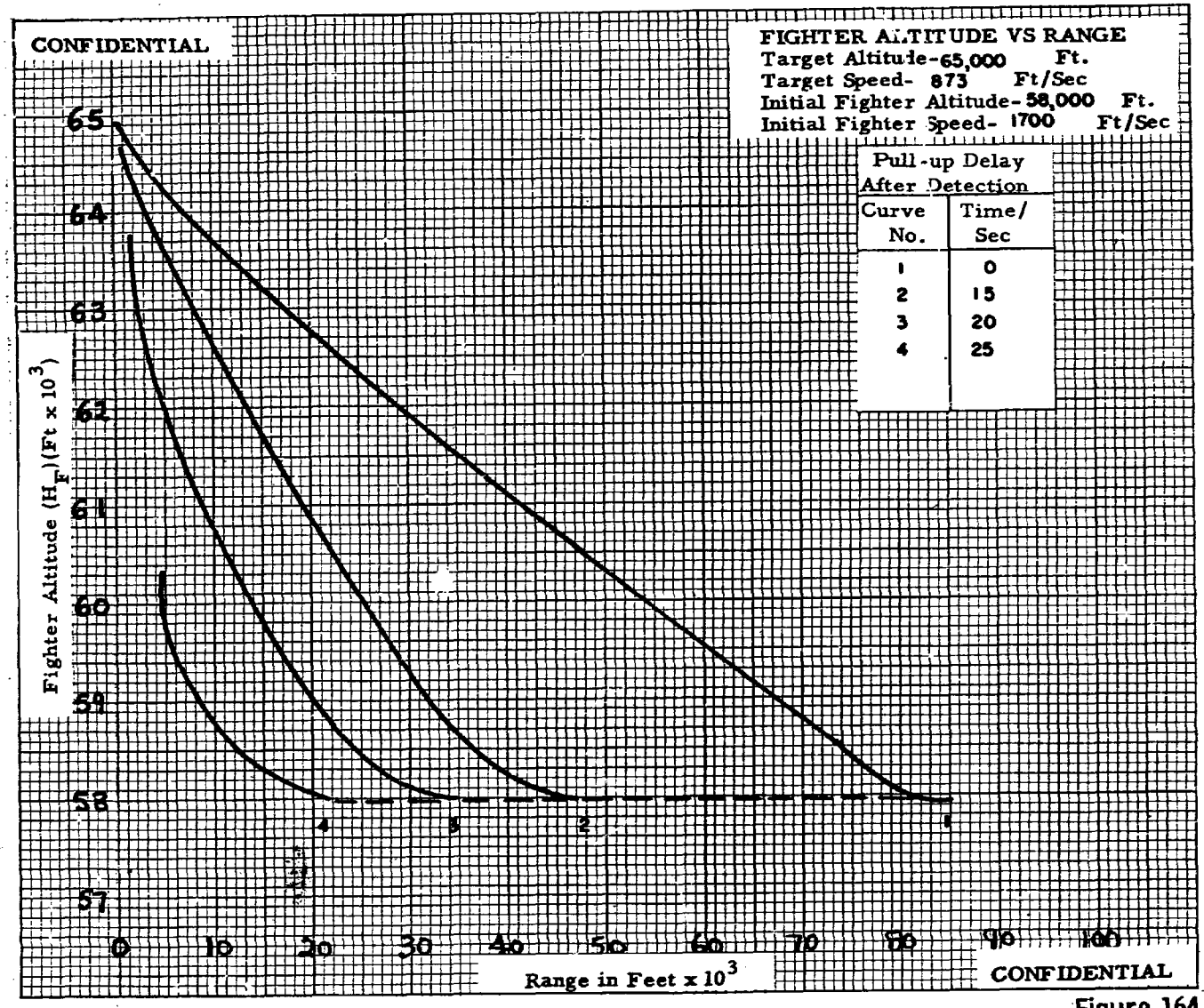
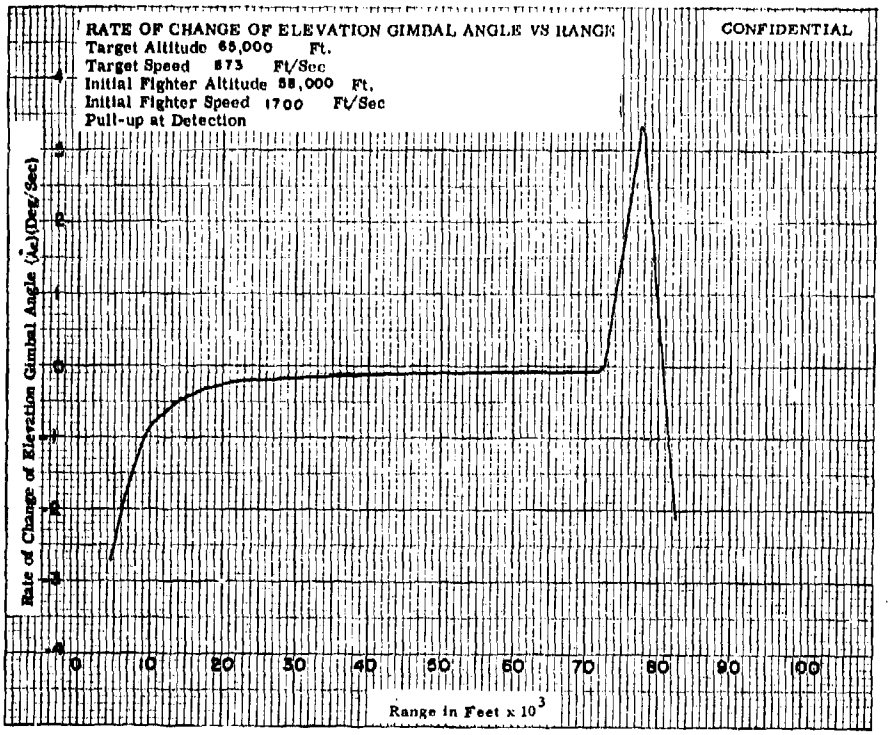

CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed- 1700 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 15
3 | 20
4 | 25
Fighter Altitude (H_F)(Ft x 10^3)
65
64
63
62
61
60
59
58
57
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 164


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up at Detection
CONFIDENTIAL
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

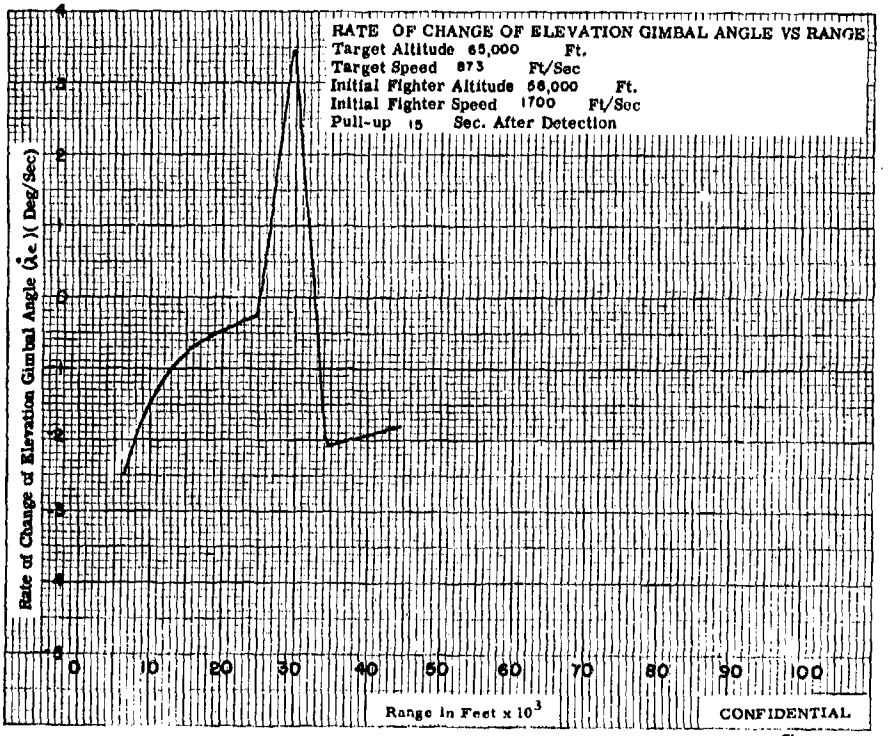
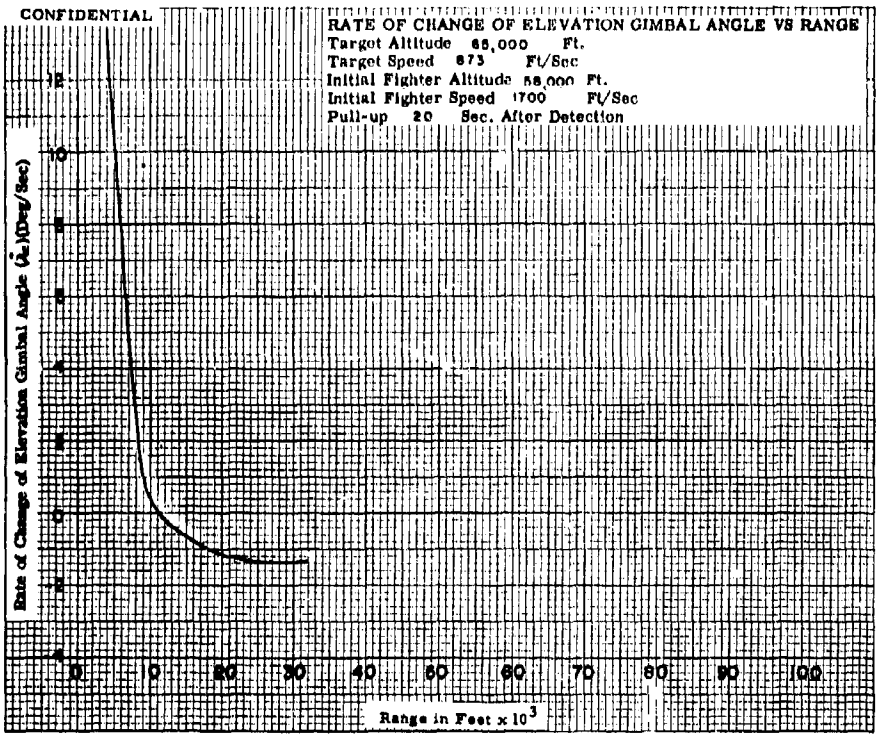
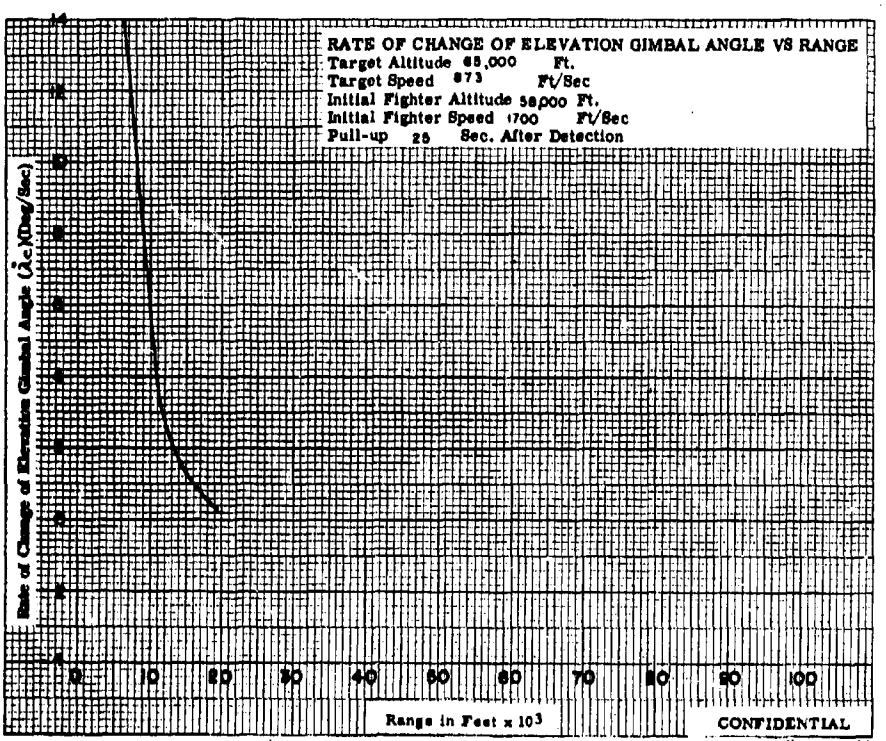

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λ̇e) (Deg/Sec)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 165

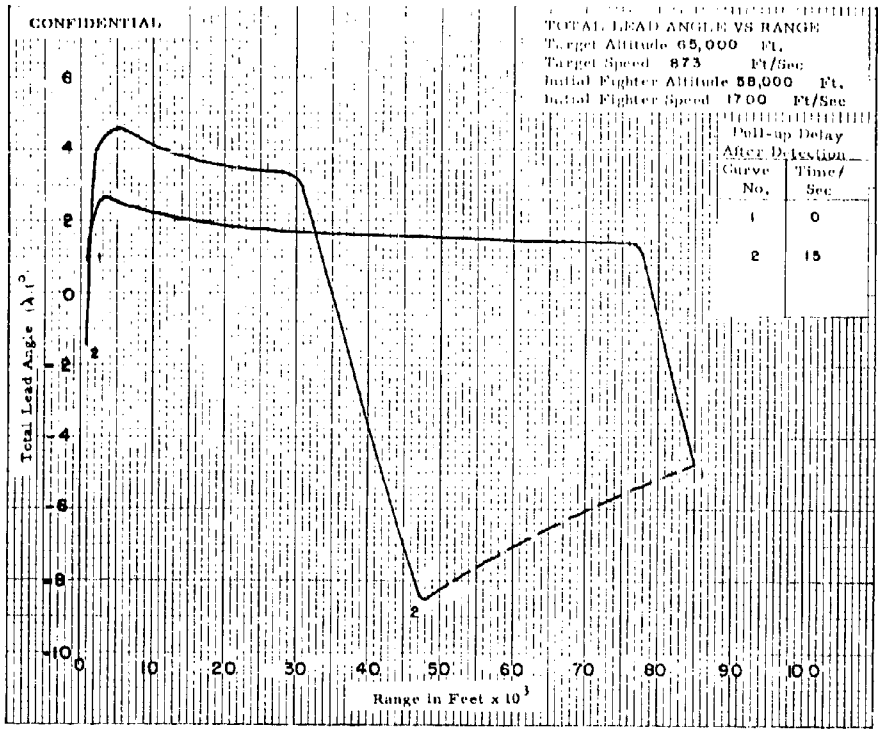
CONFIDENTIAL





CONFIDENTIAL

Figure 166


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 15
Total Lead Angle (λ)(°)
Range in Feet x 10³

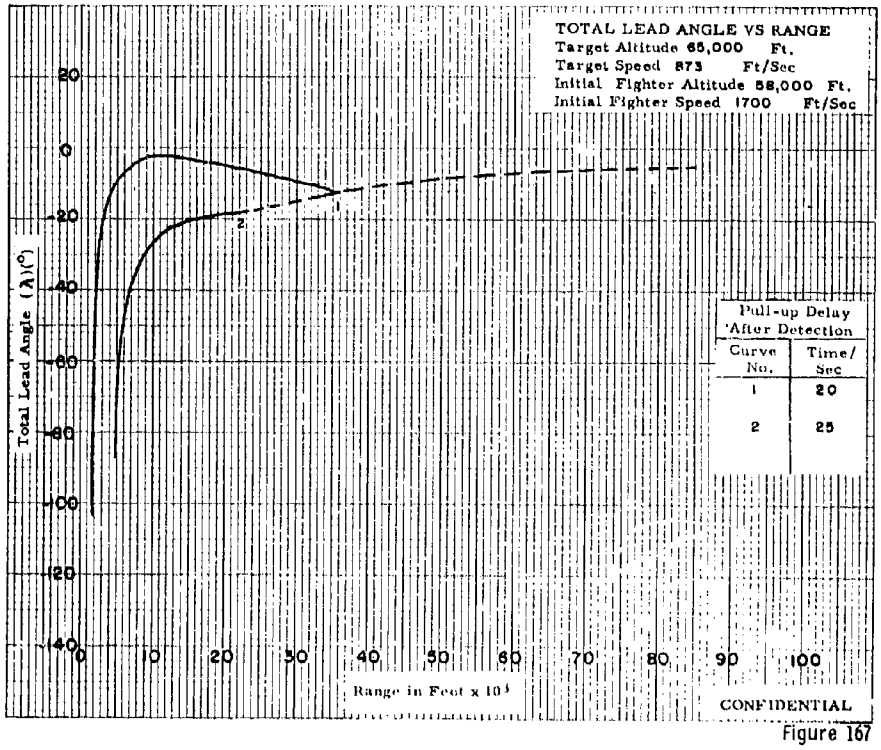
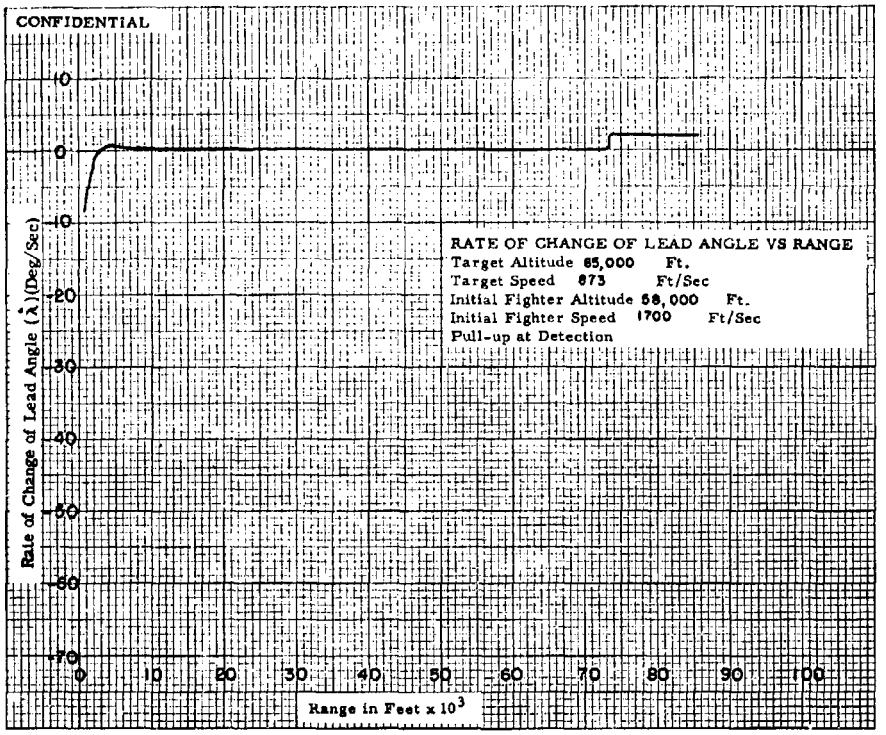

TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 20
2 | 25
Total Lead Angle (λ)(°)
Range in Feet x 10³
CONFIDENTIAL

Figure 167


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
10
0
-10
-20
-30
-40
-50
-60
-70
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

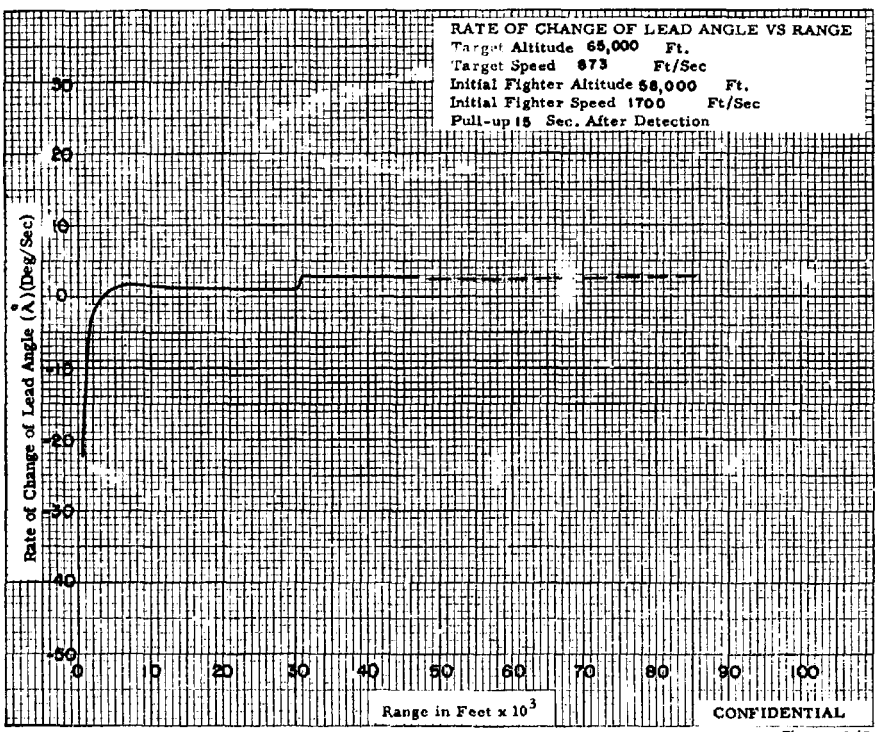
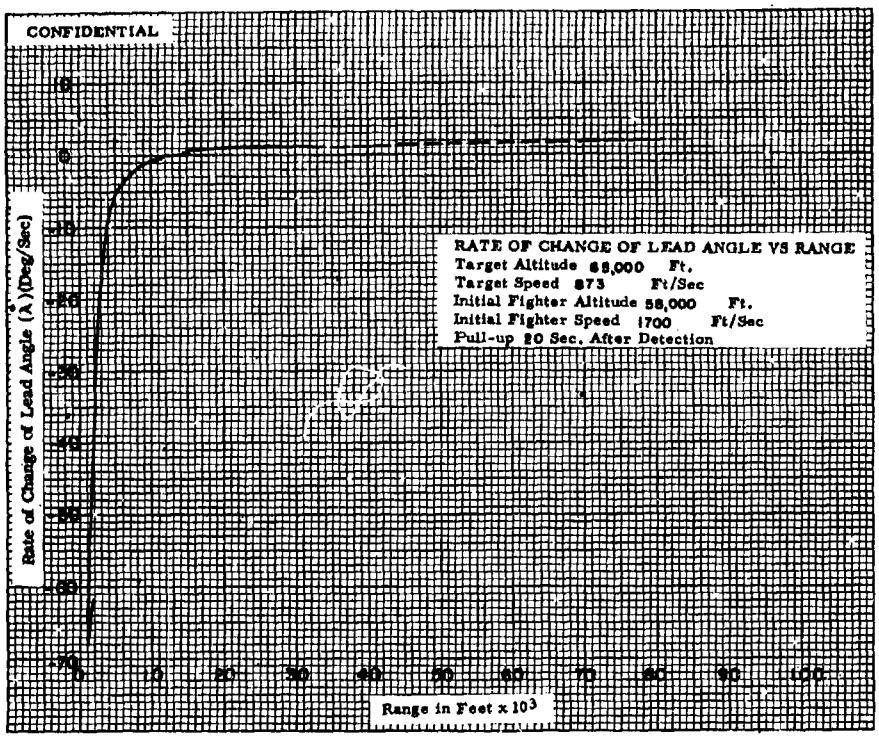

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
30
20
10
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 168


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 68,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 20 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
Range in Feet x 10³

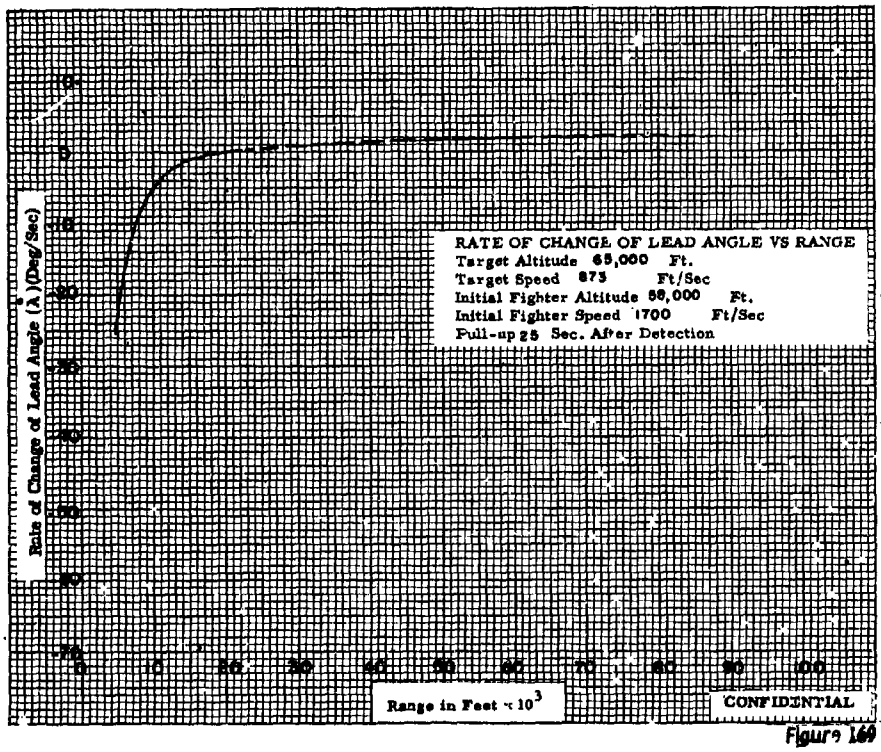

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 56,000 Ft.
Initial Fighter Speed 1700 Ft/Sec
Pull-up 25 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
Range in Feet x 10³

Figure 169

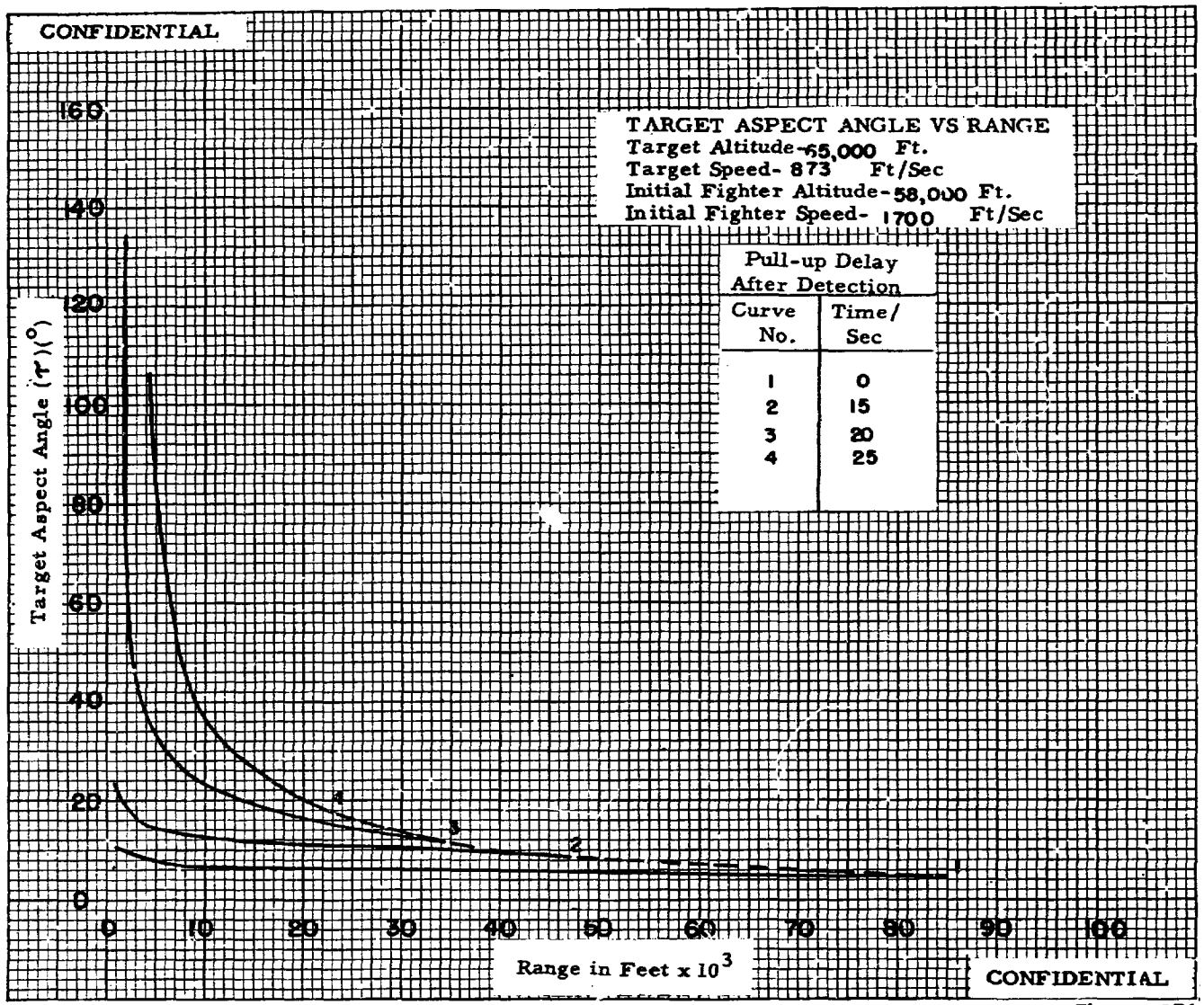
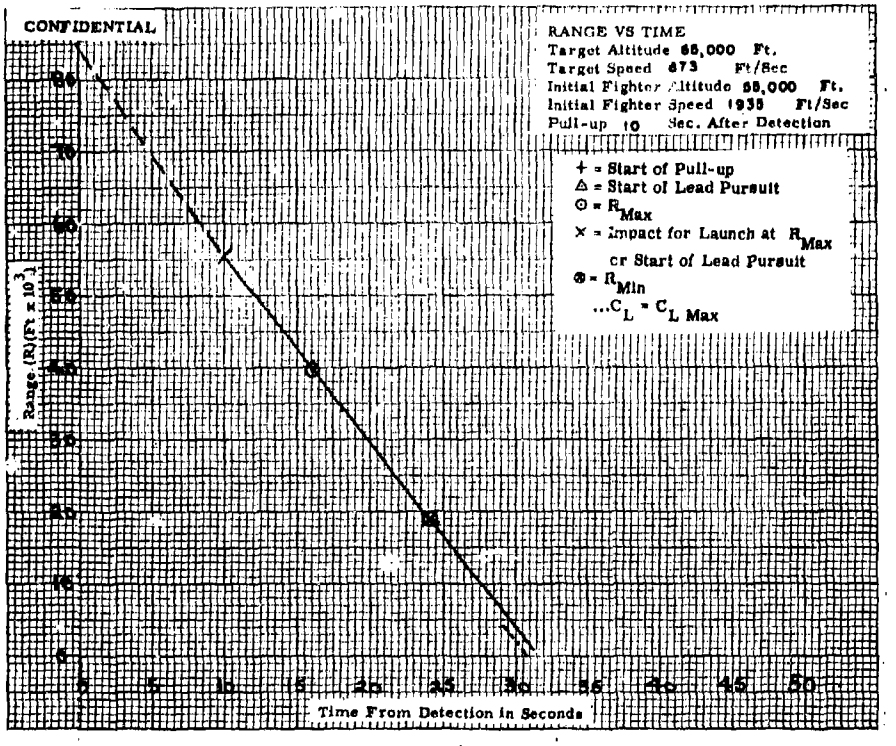

CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed- 1700 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 15
3 | 20
4 | 25
Target Aspect Angle (τ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 170.


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊛ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds

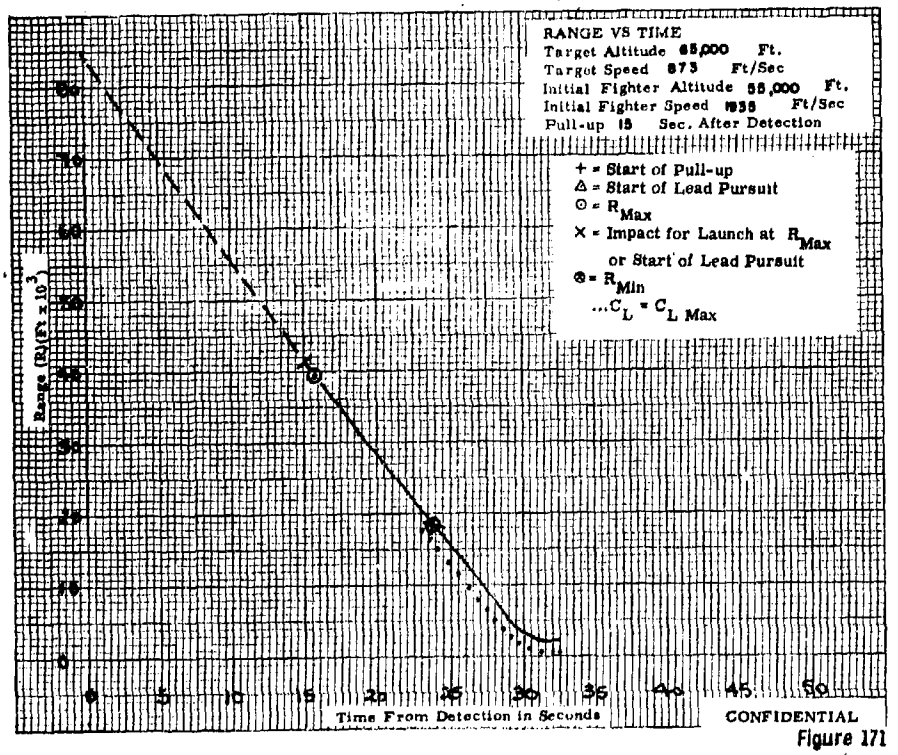

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊛ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 171

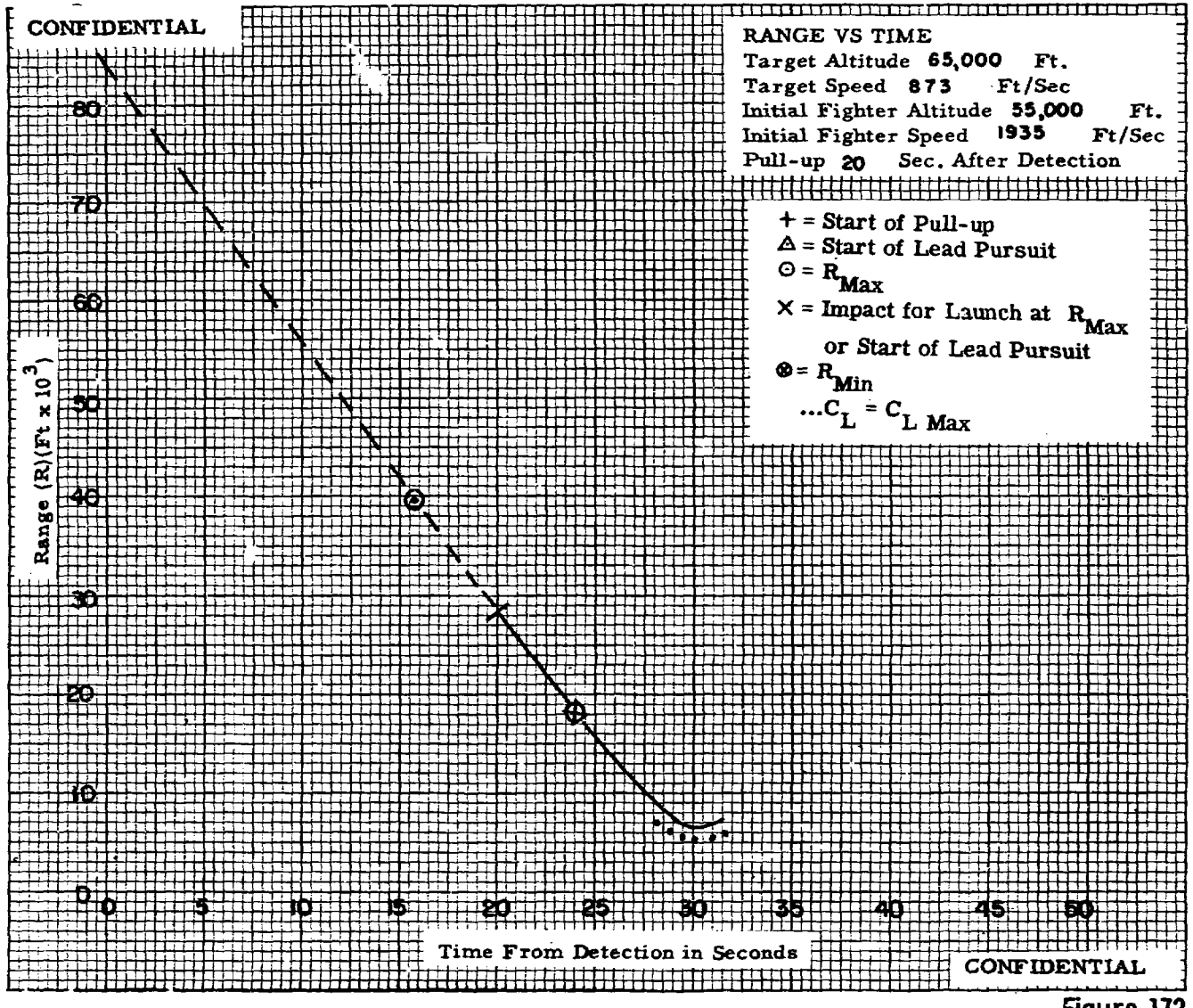
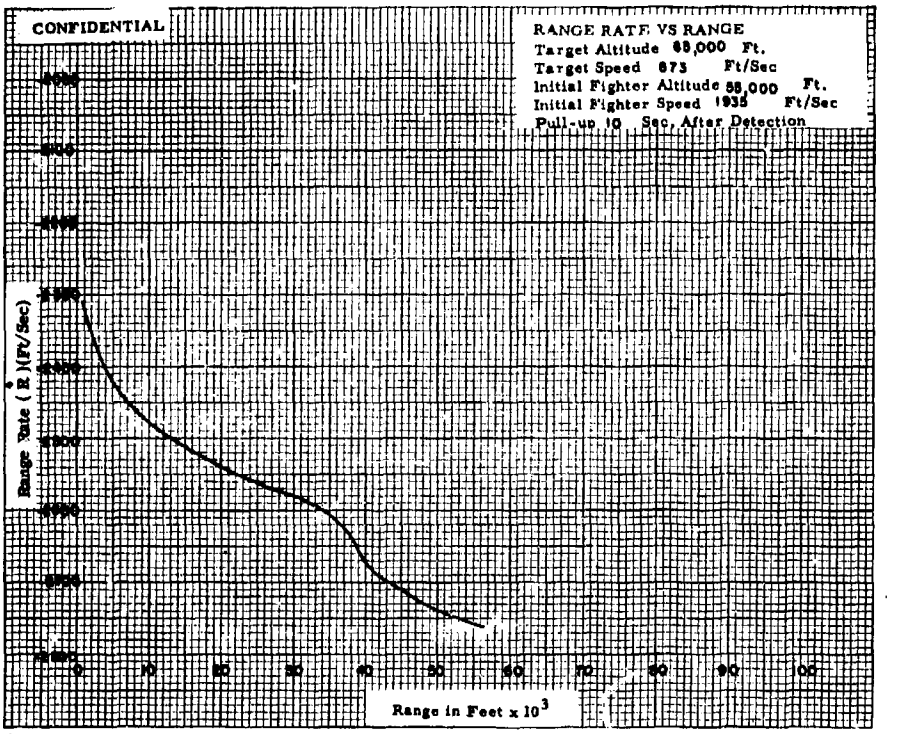

CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 20 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
CONFIDENTIAL

Figure 172


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
Range in Feet x 10^3

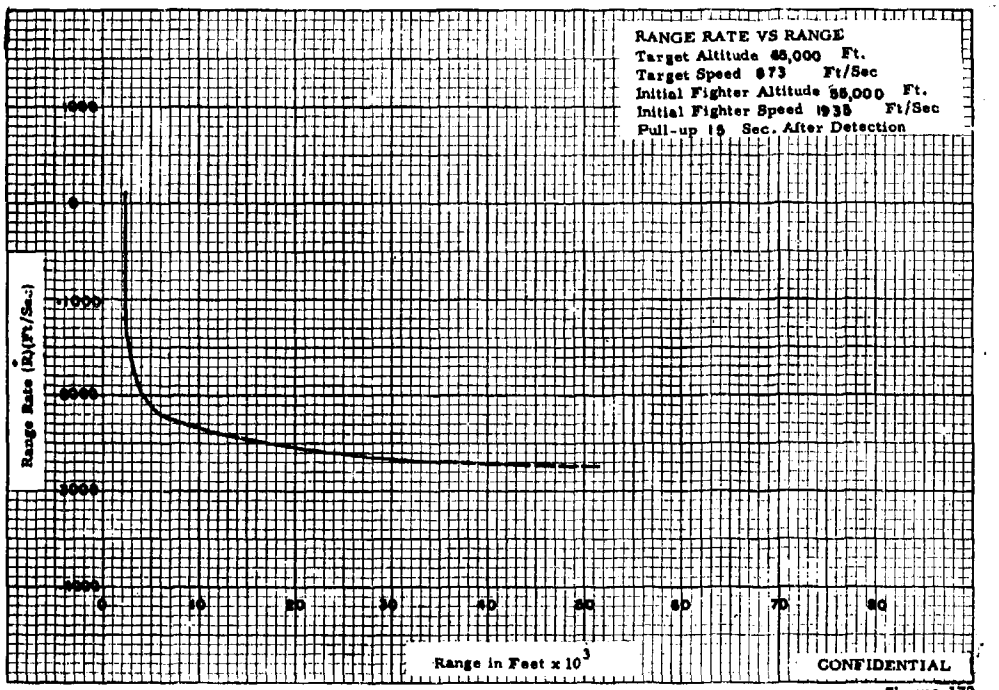

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 173

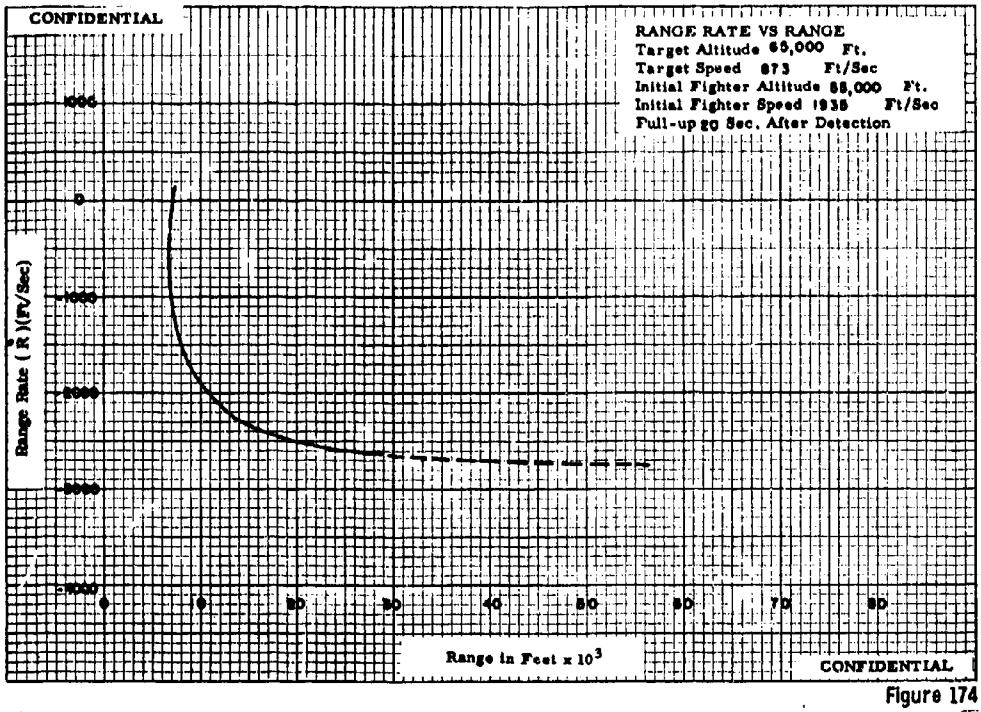


Figure 174

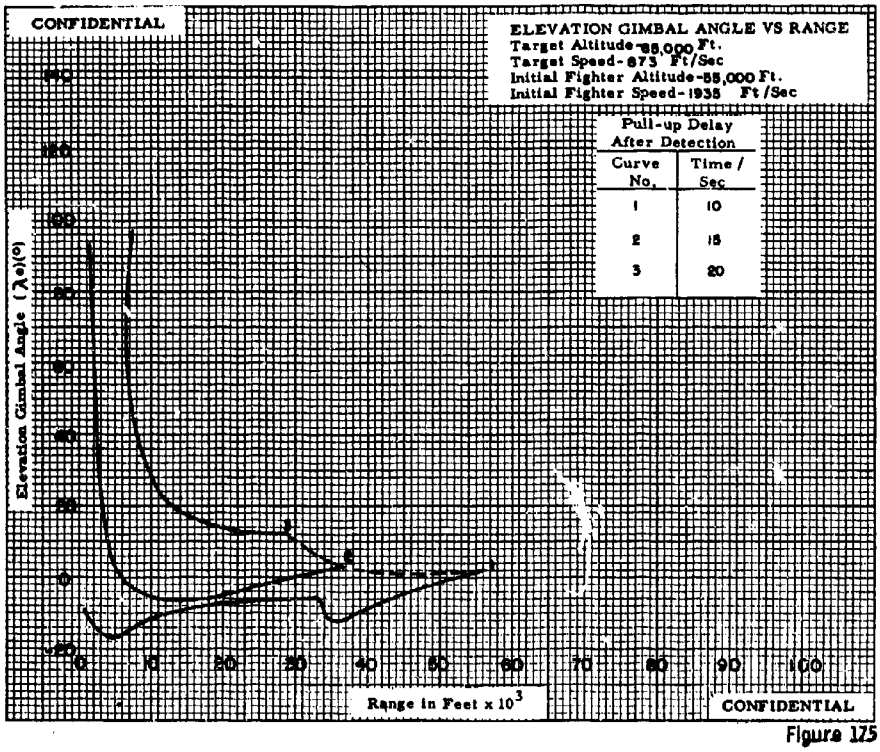


Figure 175

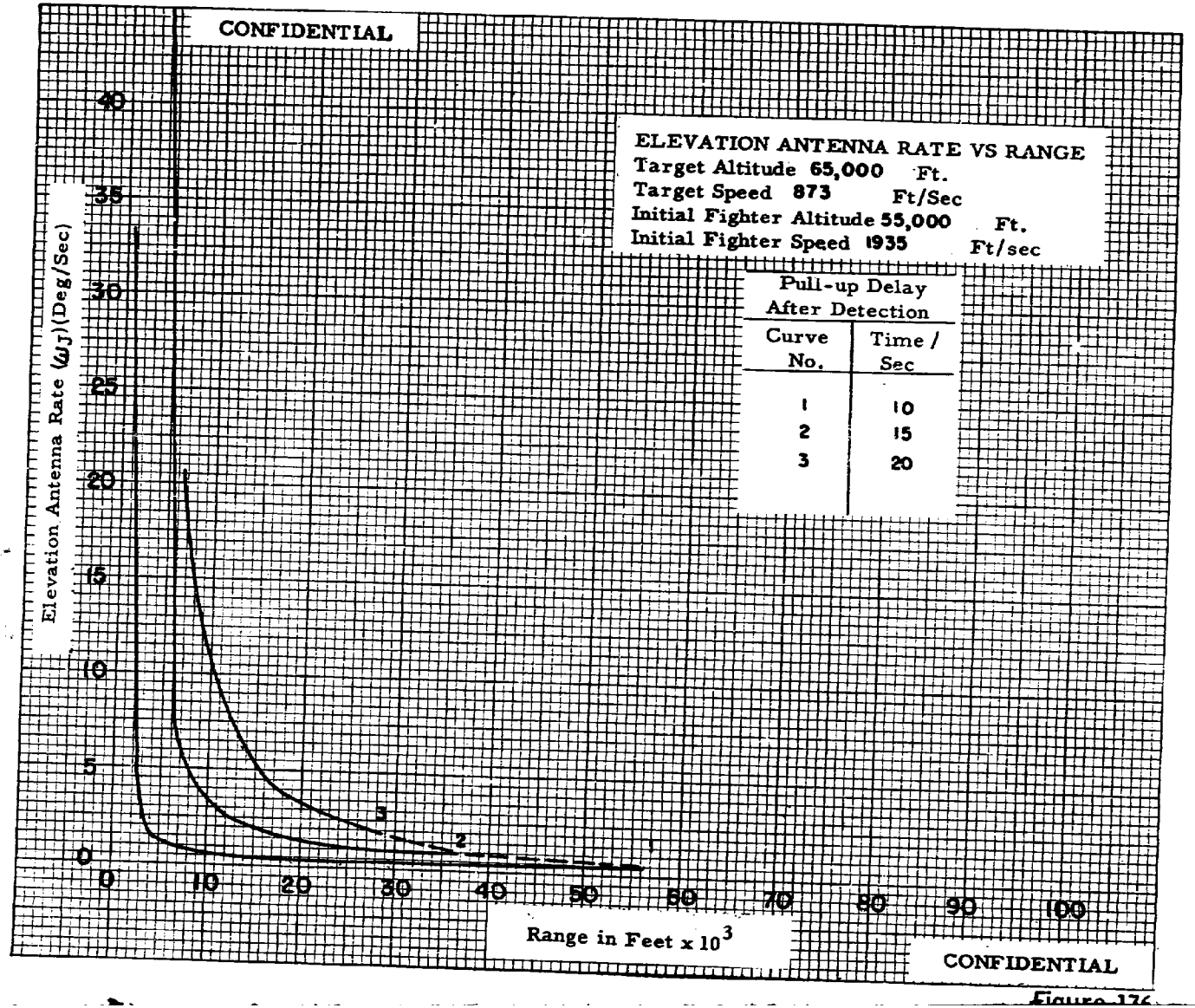
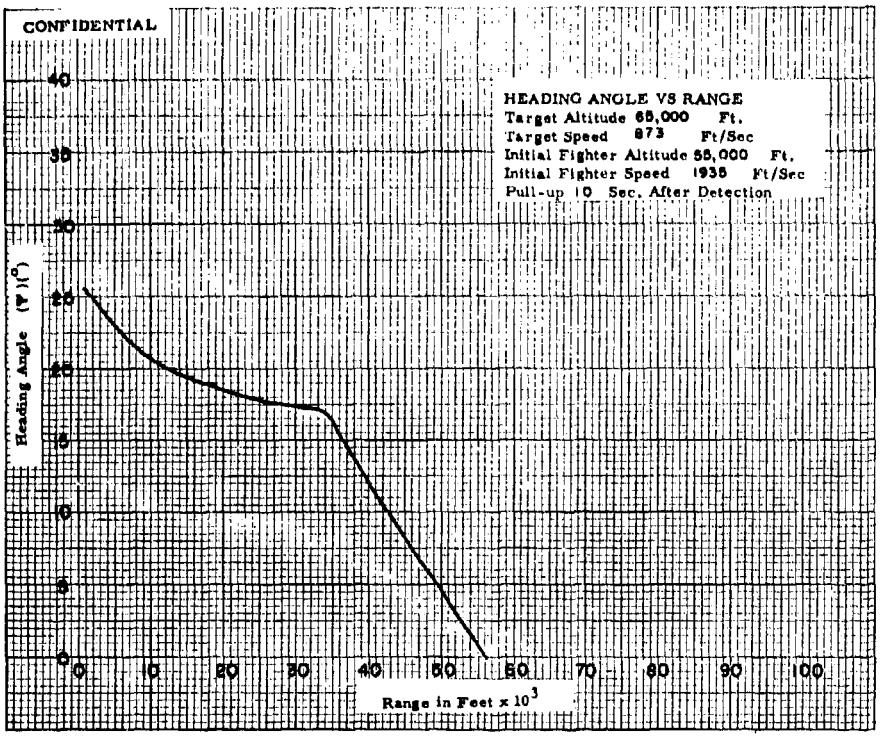

CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/sec
Pull-up Delay After Detection
Curve No. | Time / Sec
1 | 10
2 | 15
3 | 20
Elevation Antenna Rate (ωE)(Deg/Sec)
0
5
10
15
20
25
30
35
40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
1
2
3
CONFIDENTIAL

Figure 176


HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Heading Angle (ψ)(°)
Range in Feet x 10³

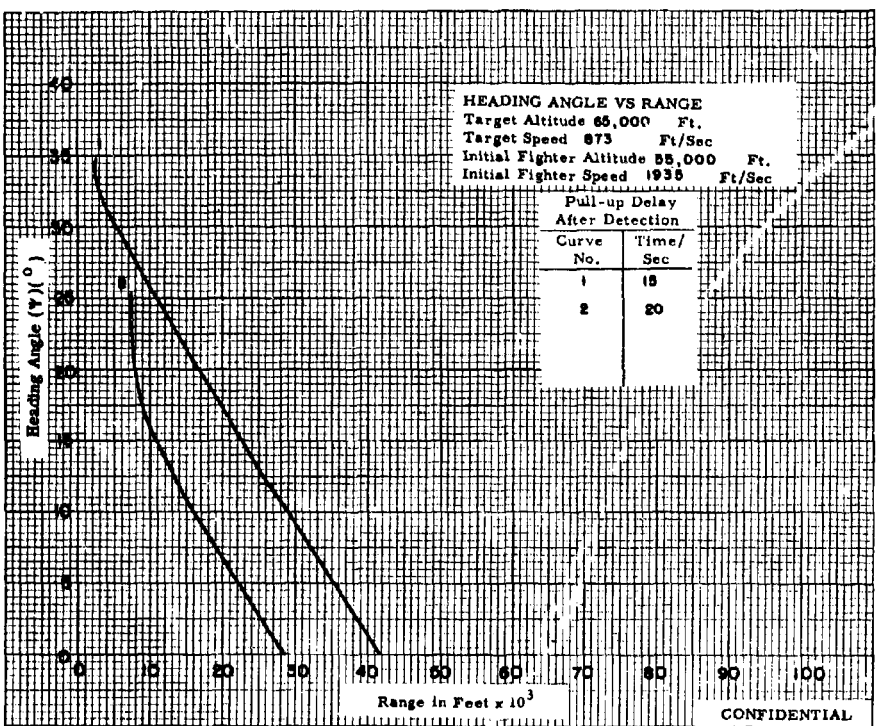
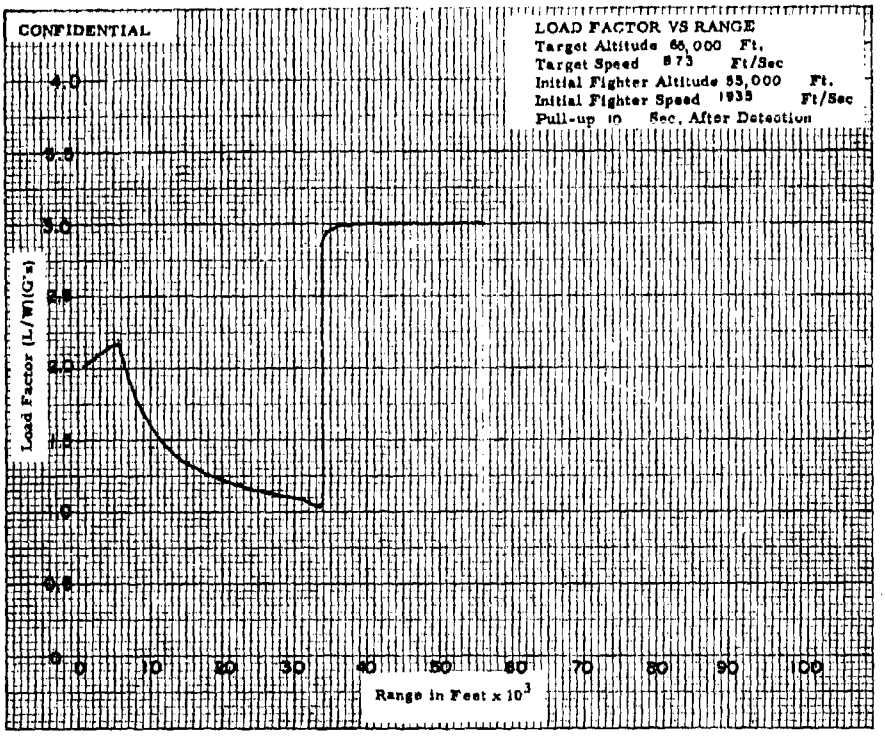

HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 15
2 | 20
Heading Angle (ψ)(°)
Range in Feet x 10³

Figure 177


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

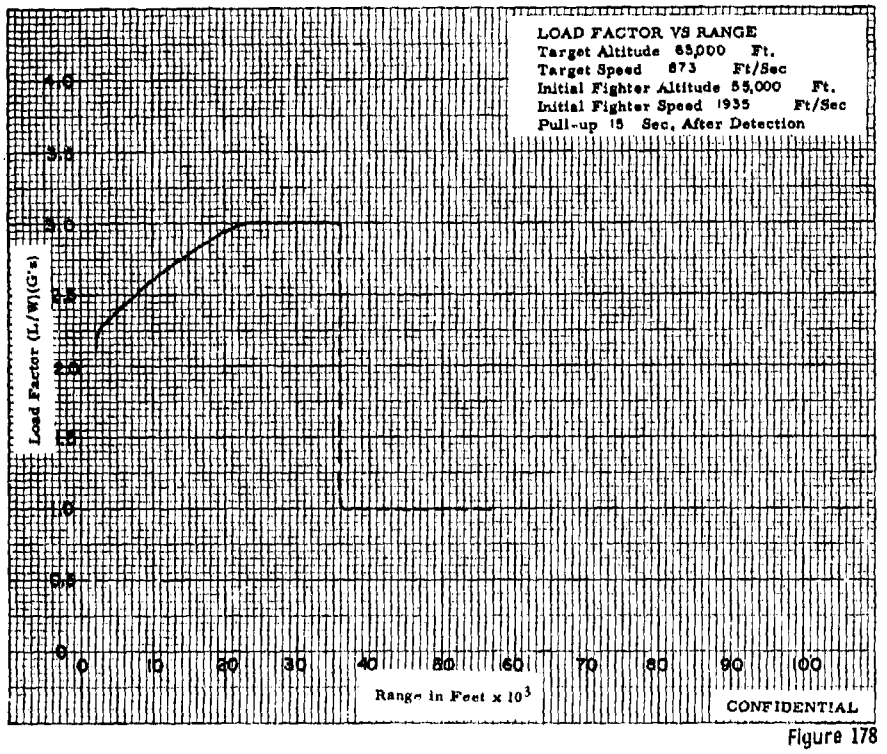

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 178

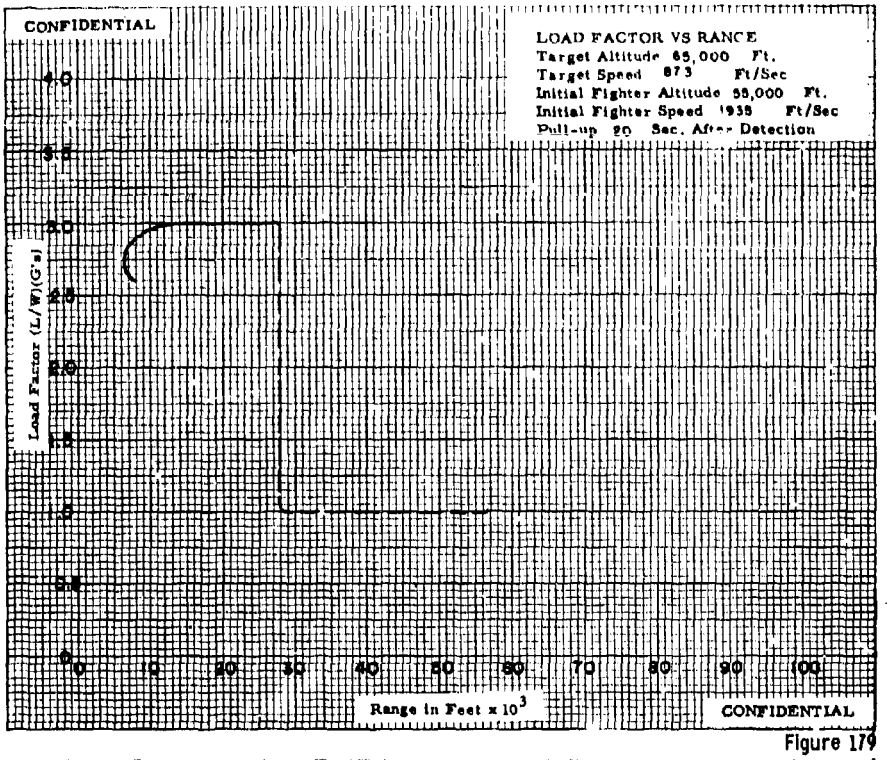


Figure 179

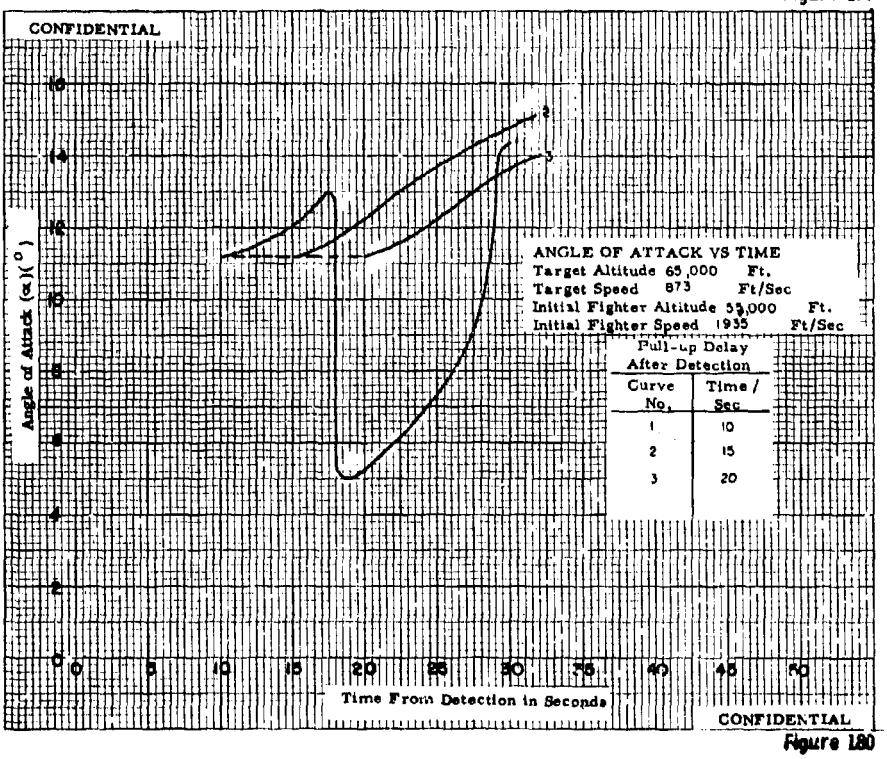


Figure 180

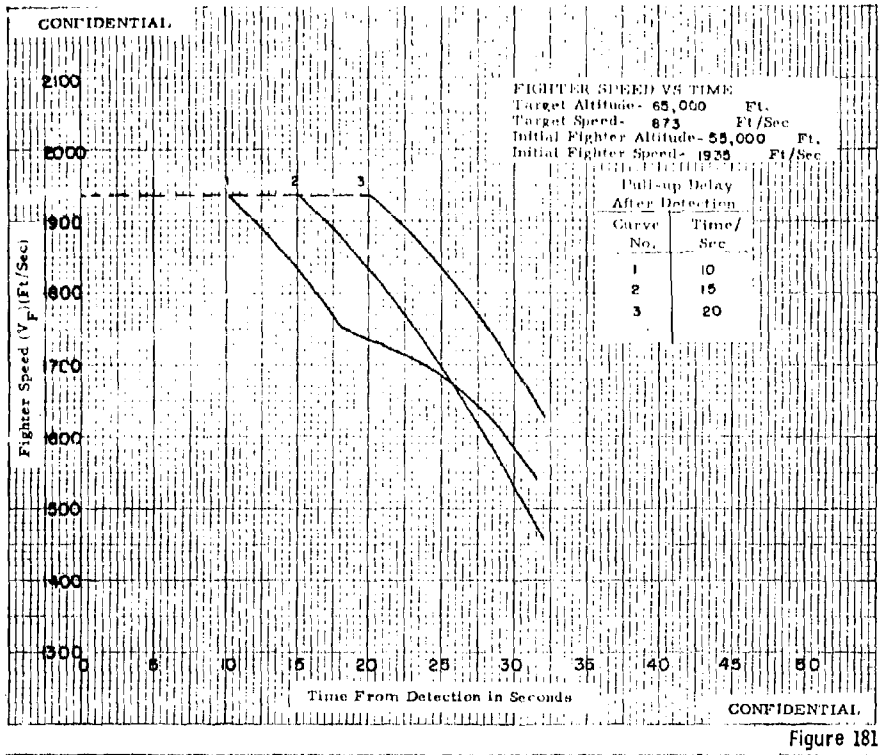


Figure 181

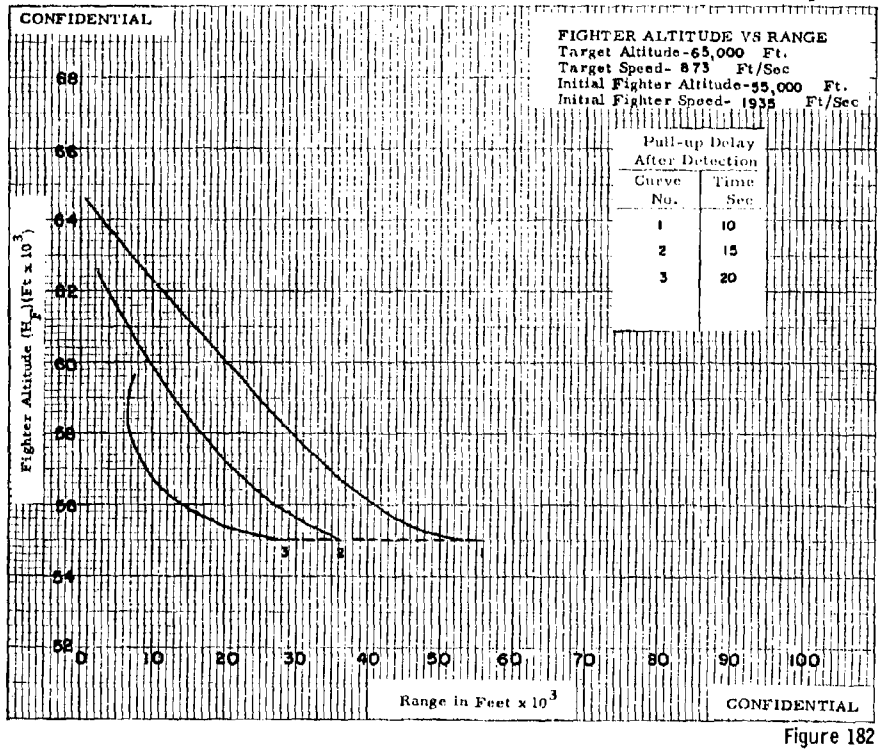
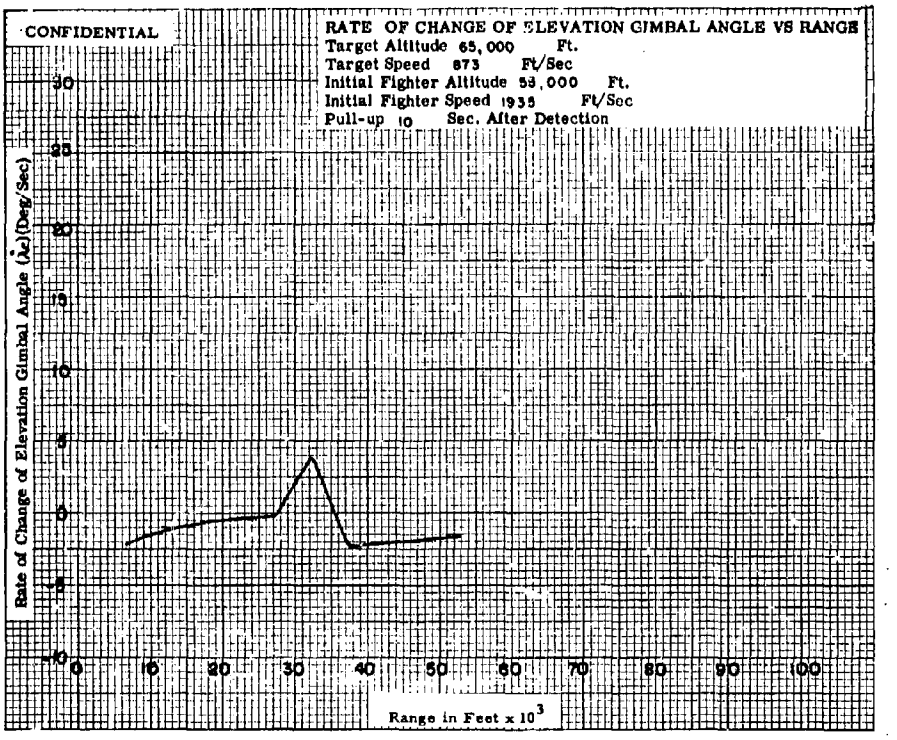


Figure 182


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 59,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

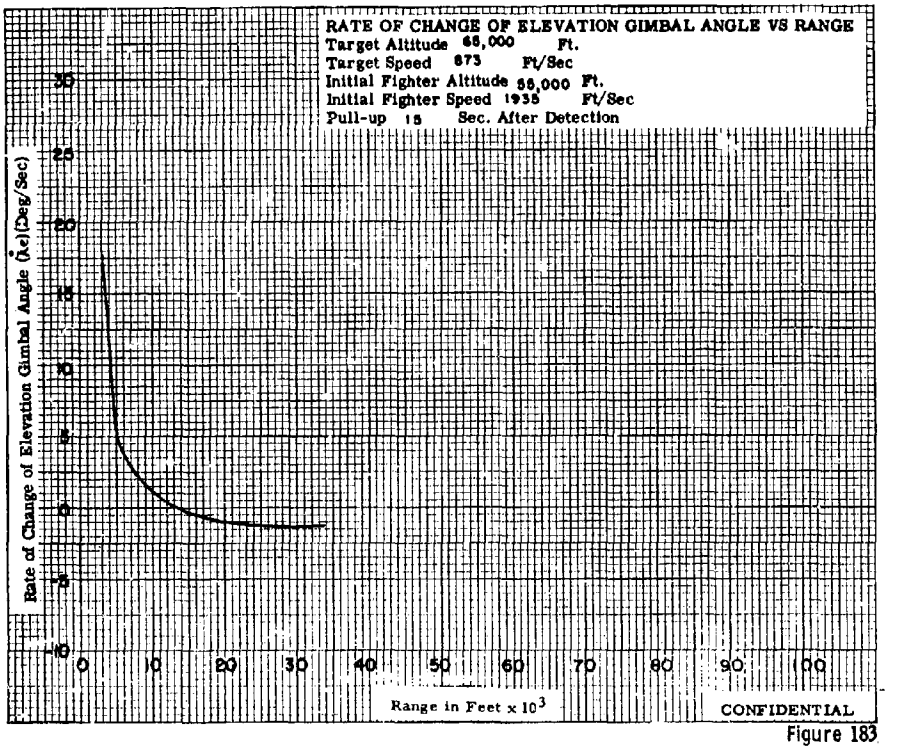

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 59,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 183

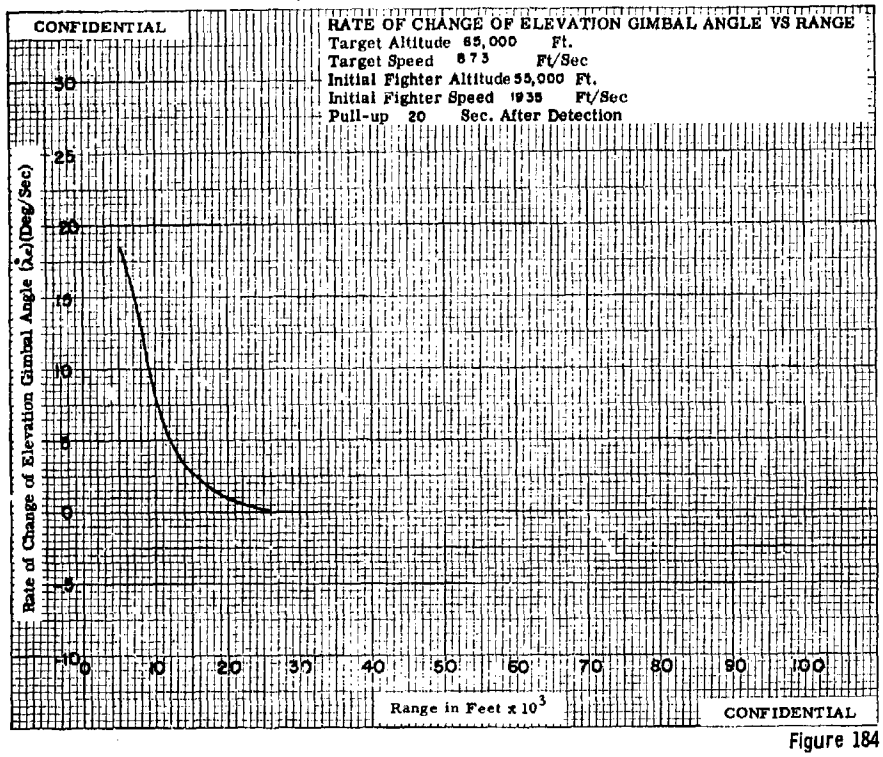


Figure 184

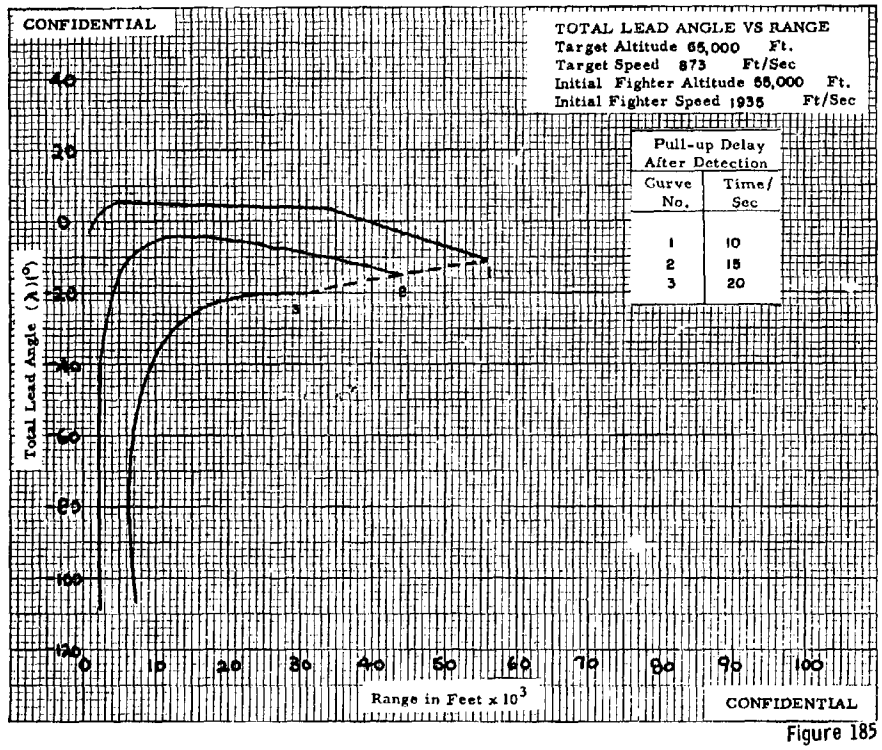
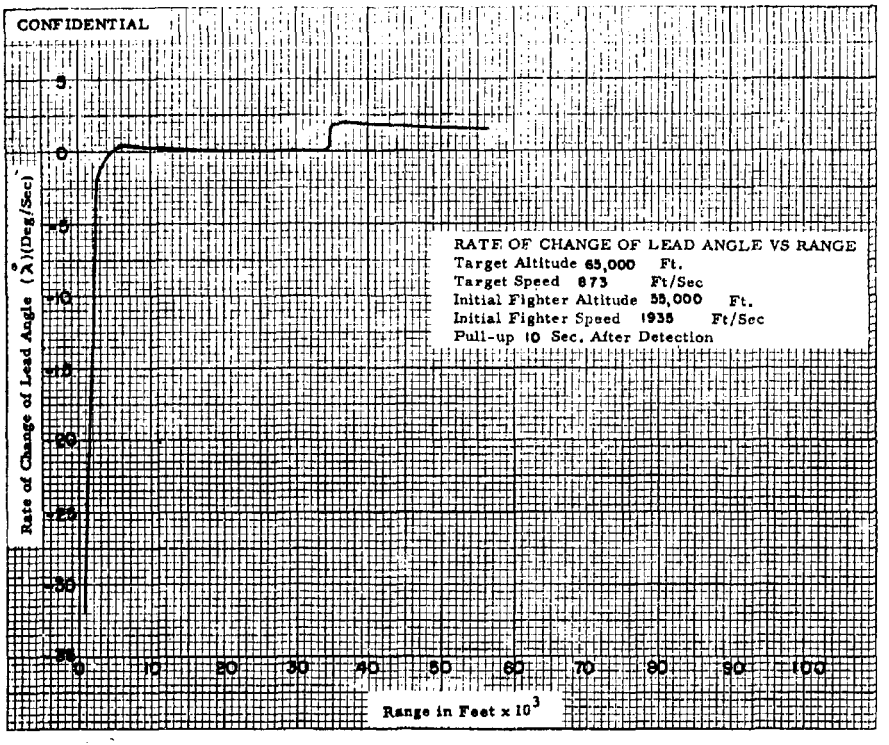


Figure 185


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
5
0
-5
-10
-15
-20
-25
-30
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

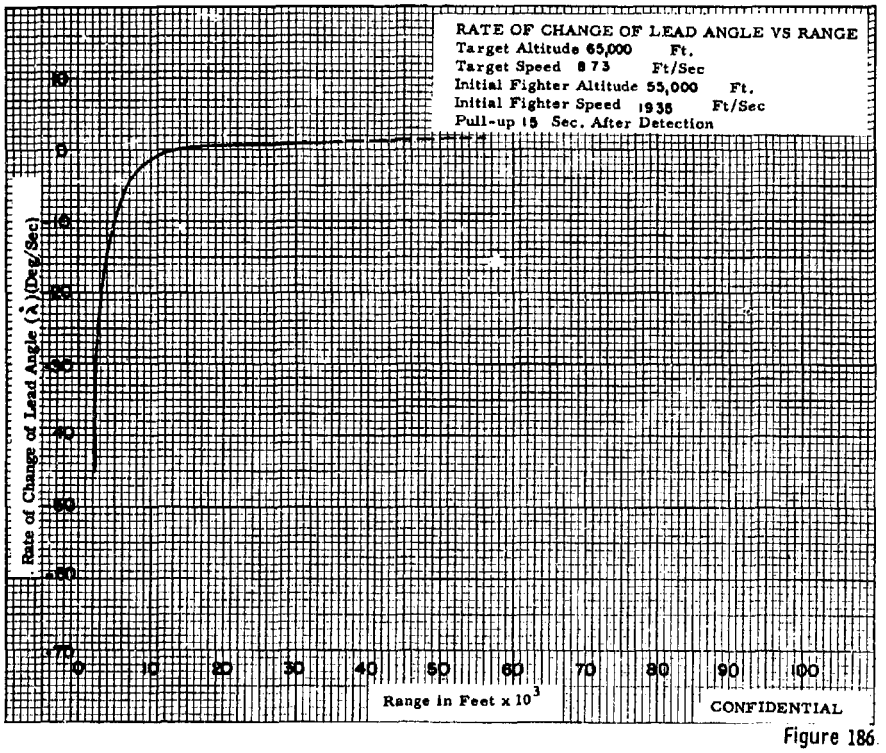

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 55,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
10
0
-10
-20
-30
-40
-50
-60
-70
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 186

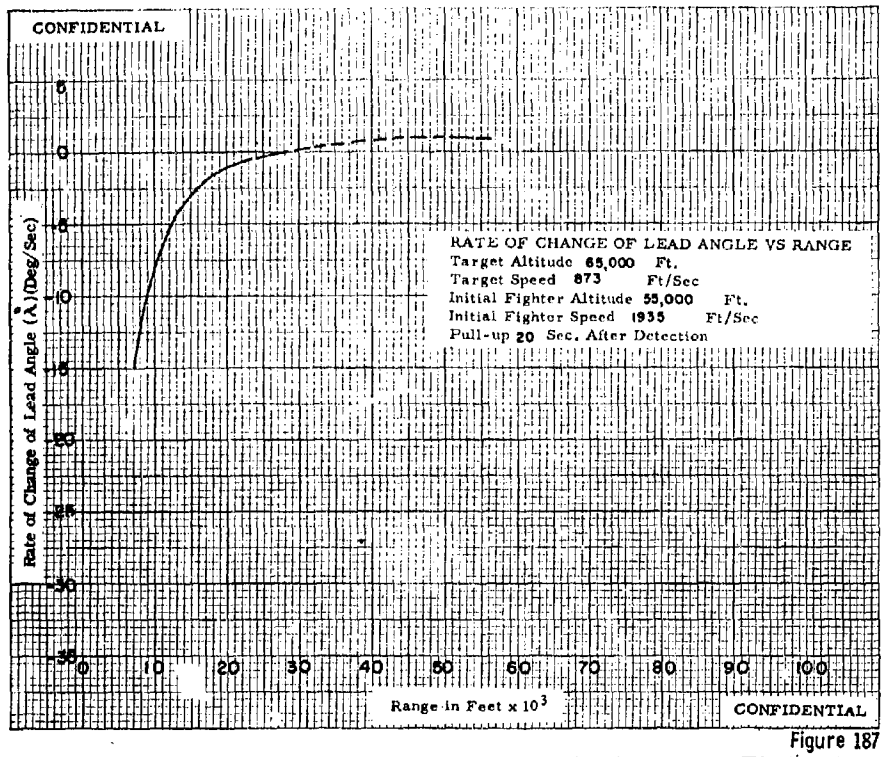


Figure 187

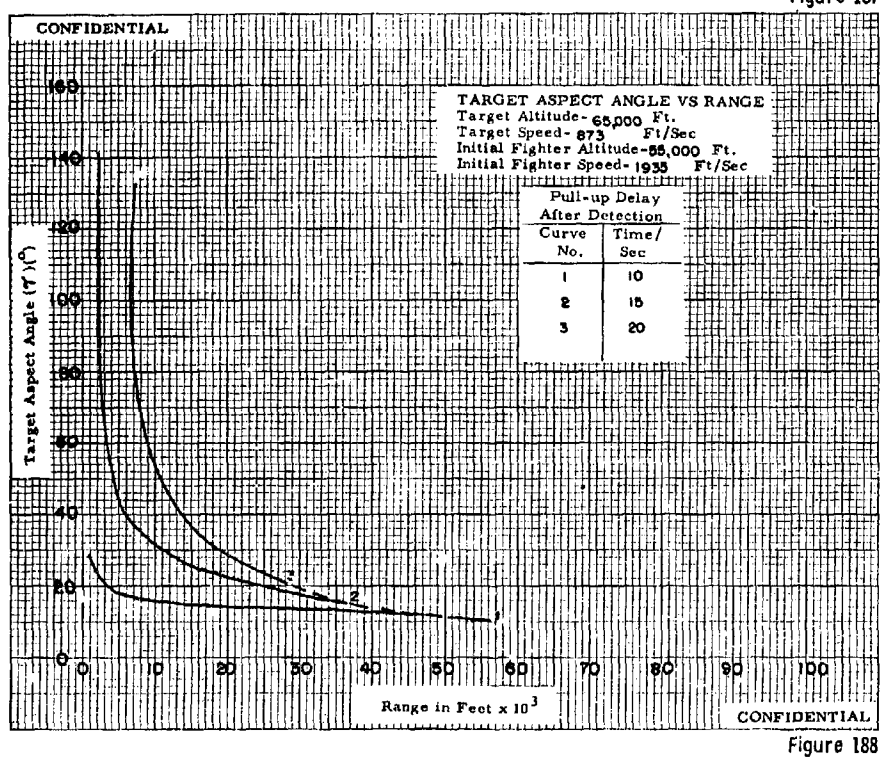
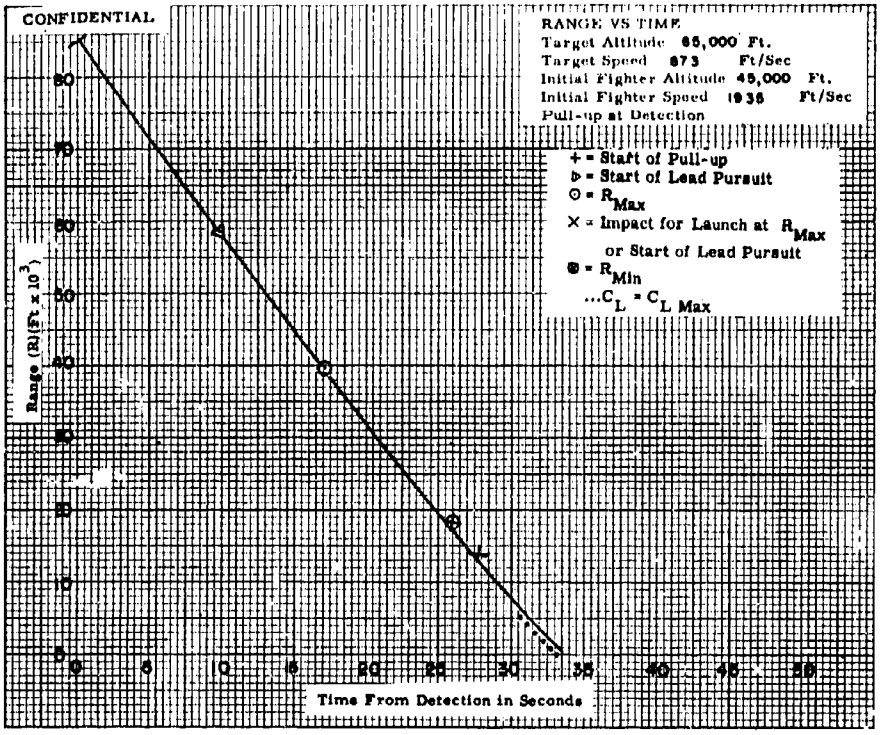


Figure 188


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1938 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊛ = R_{Min} ...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

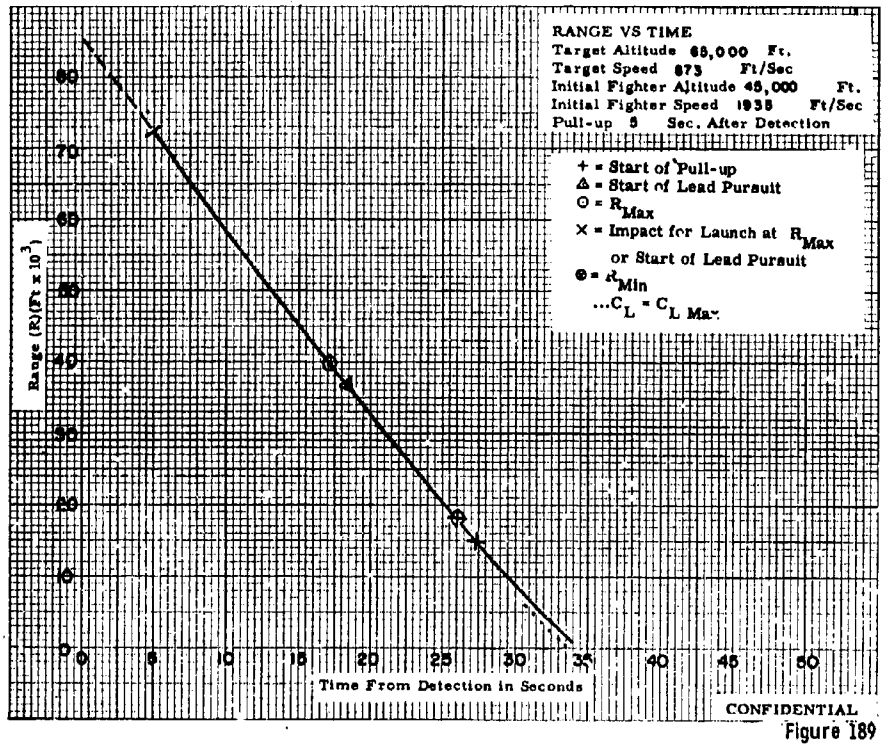
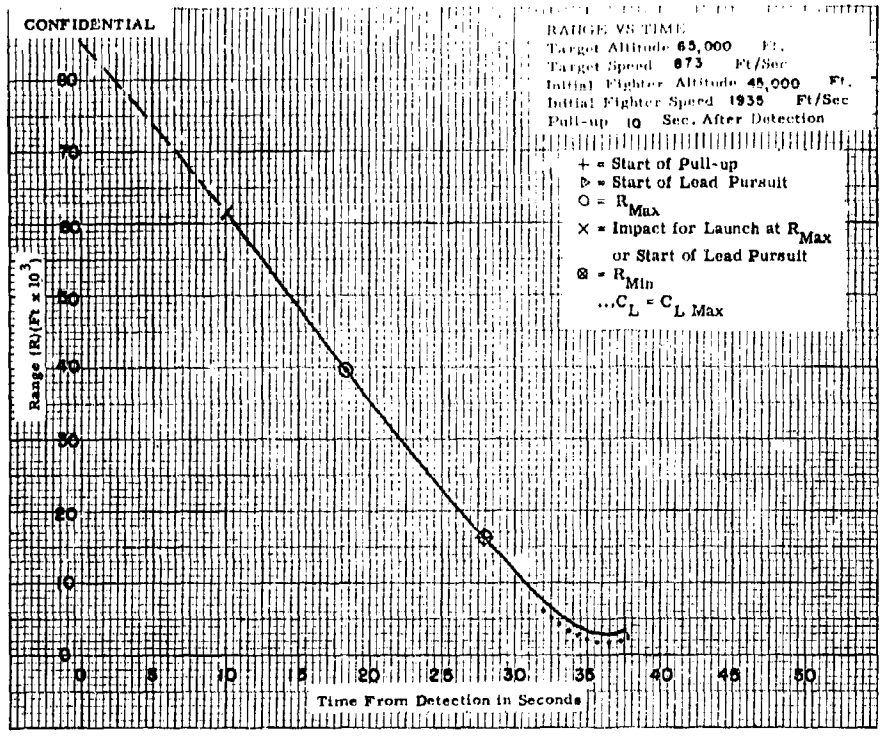

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1938 Ft/Sec
Pull-up 5 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊛ = R_{Min} ...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 189


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
80
70
60
50
40
30
20
10
0
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds

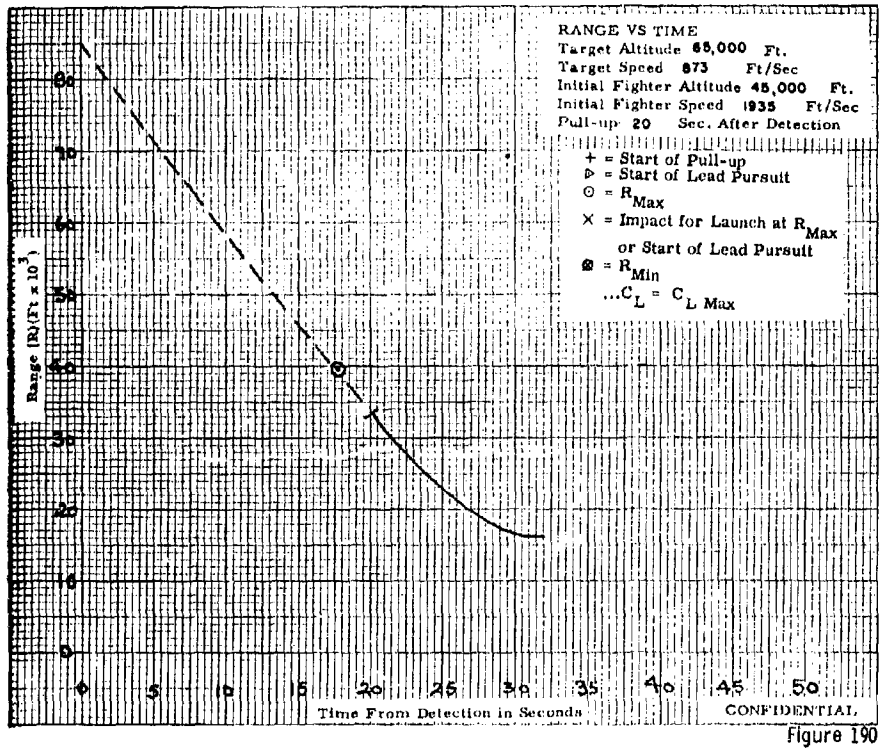

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 20 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds
CONFIDENTIAL

Figure 190

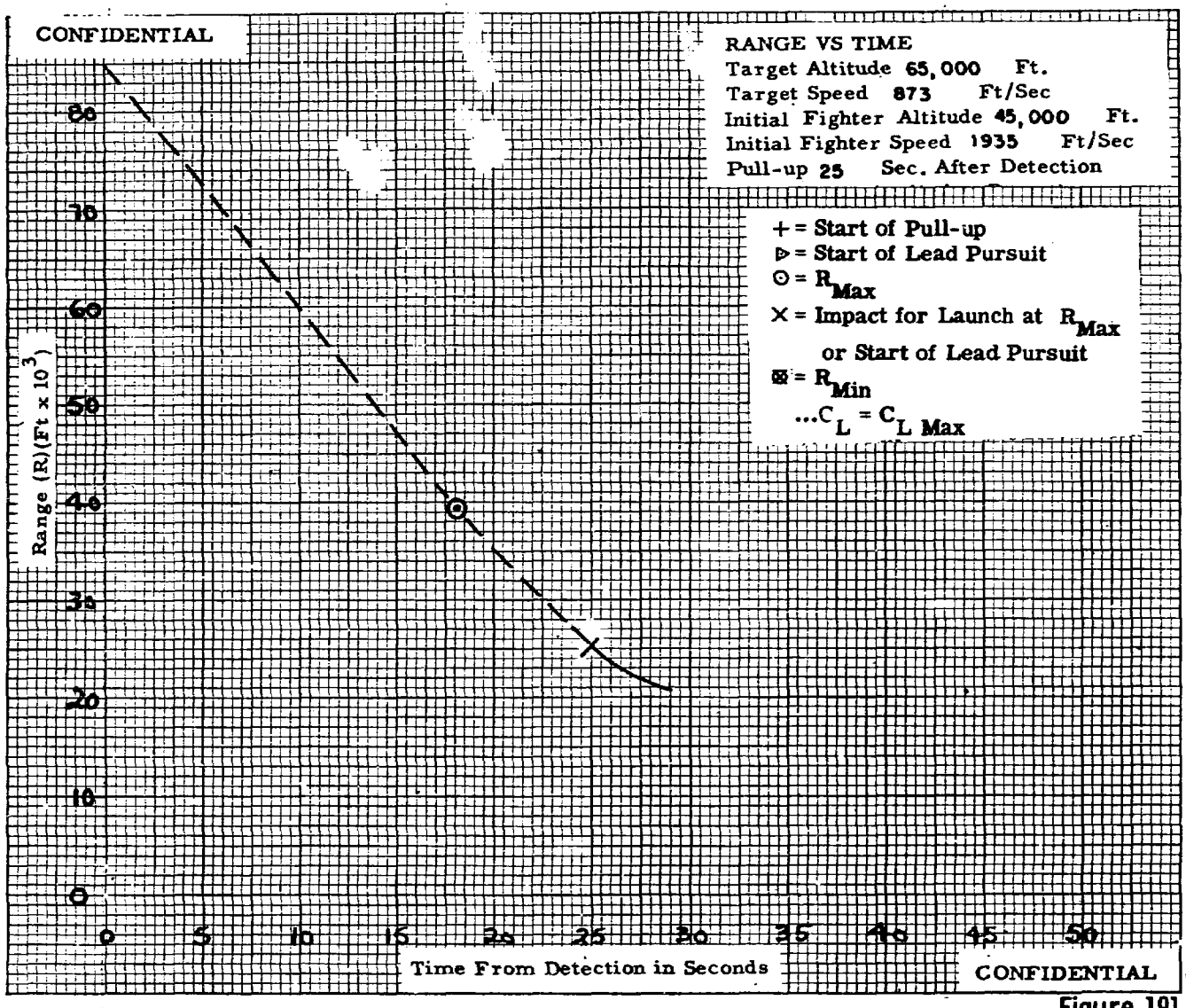
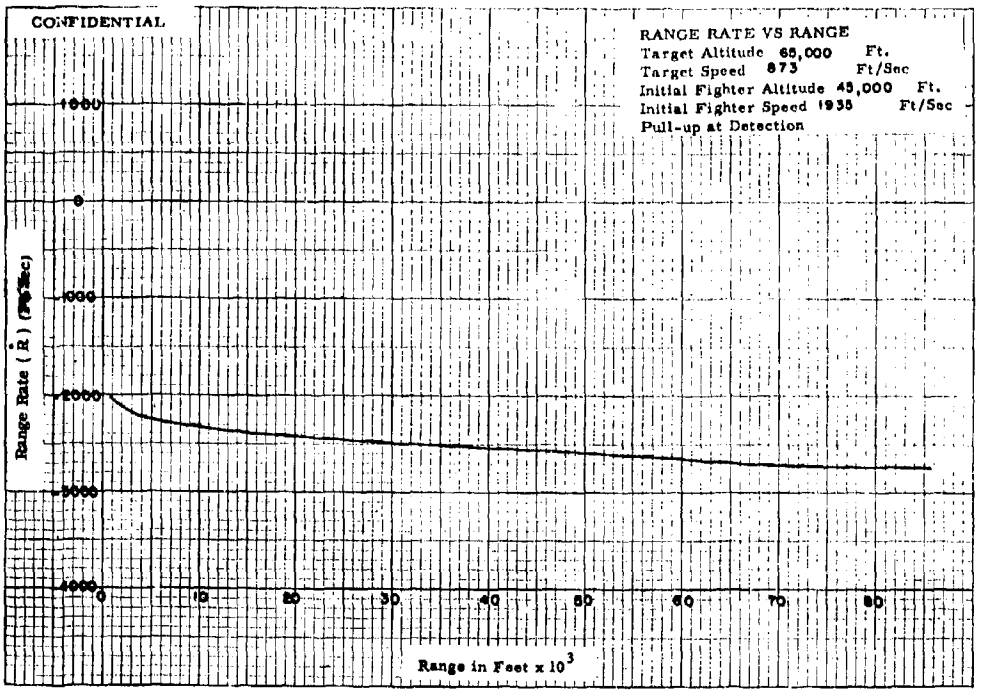

CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 25 Sec. After Detection
+ = Start of Pull-up
⊳ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
CONFIDENTIAL

Figure 191


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

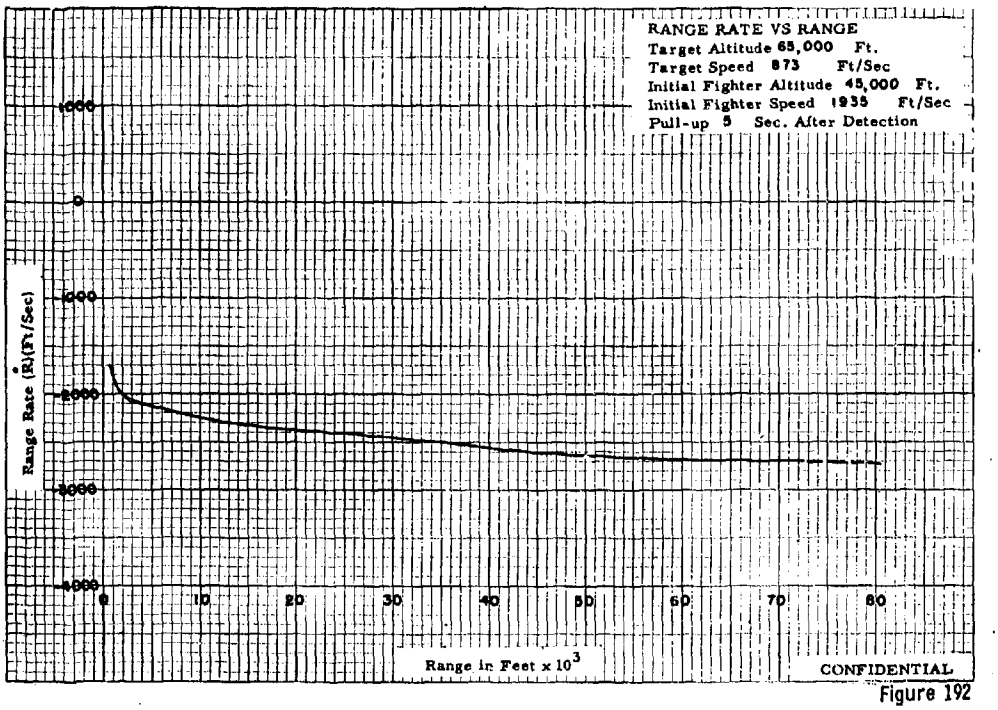
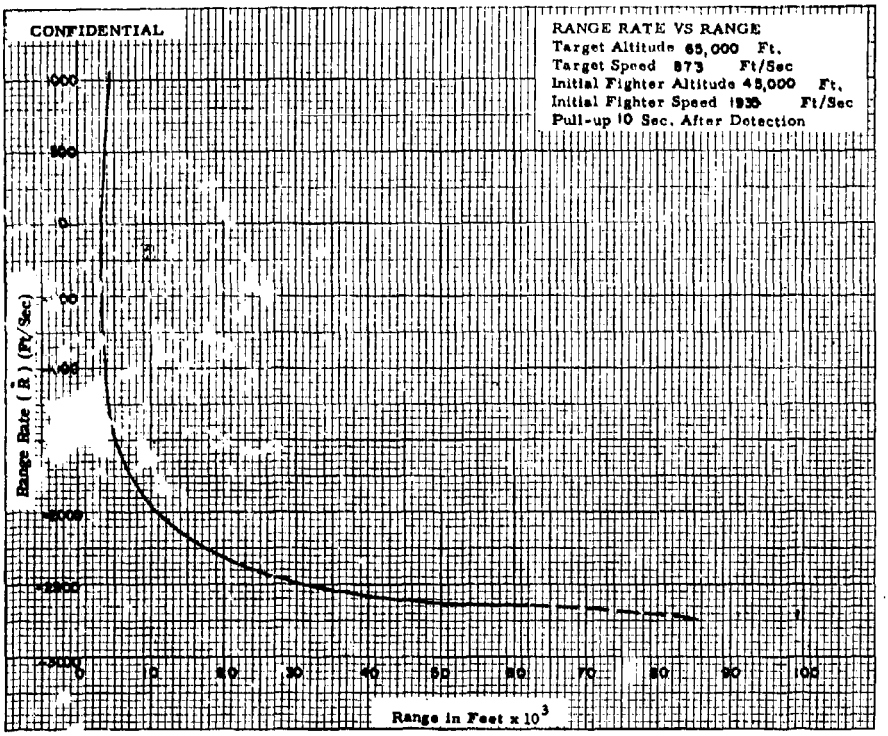

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 192


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
Range in Feet x 10^3

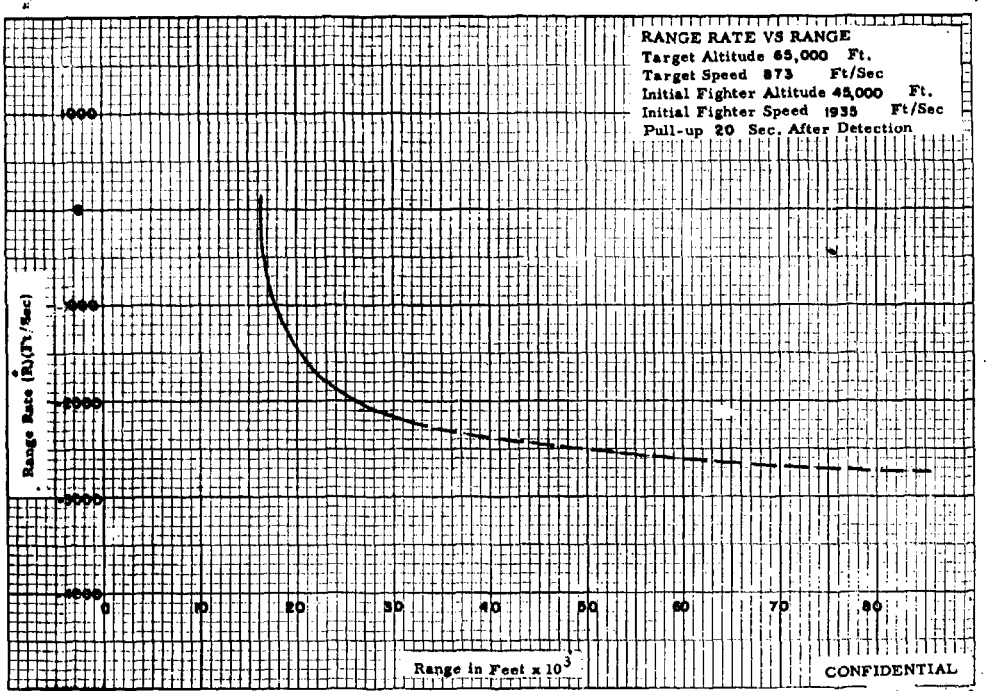

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 20 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 193

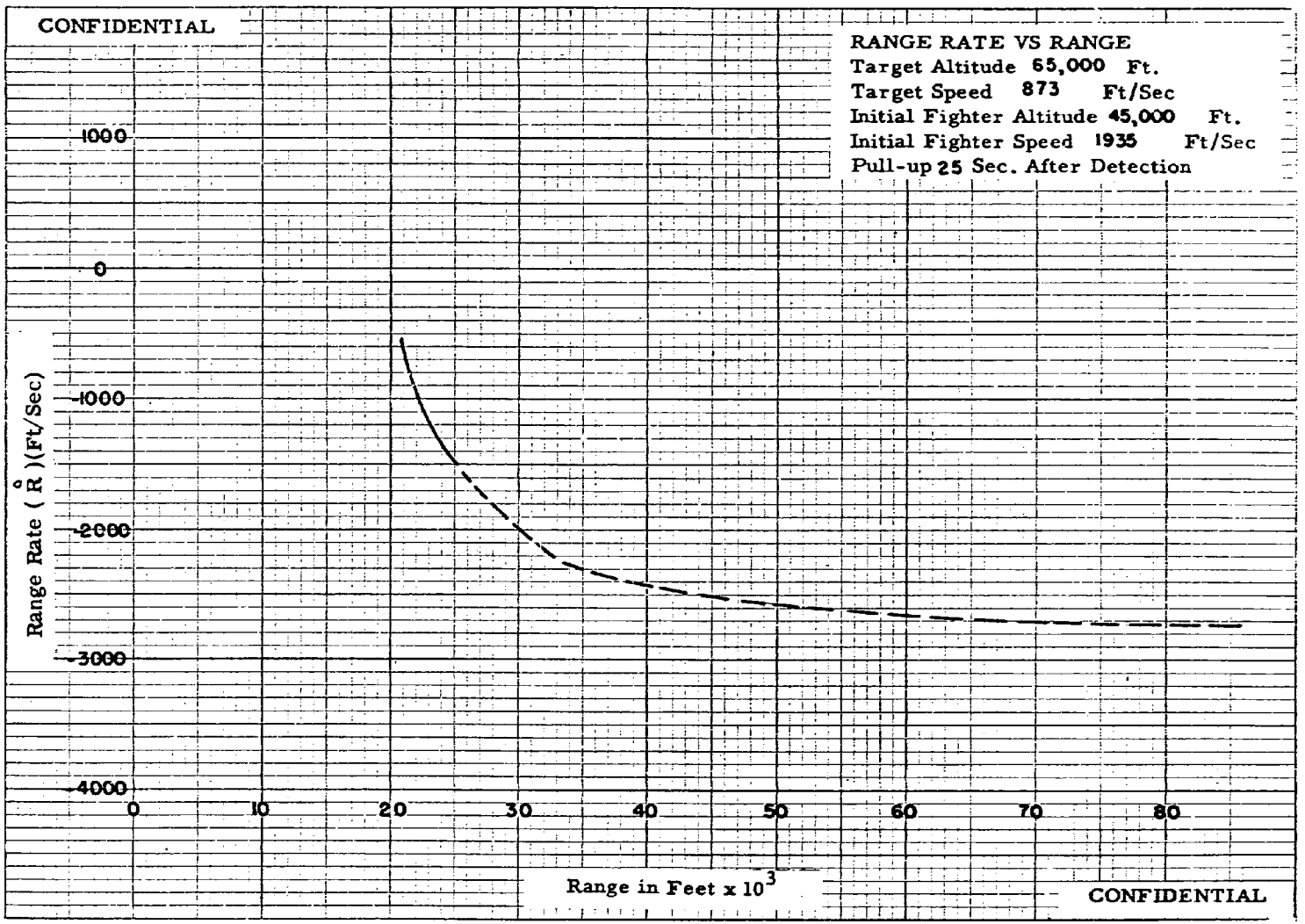
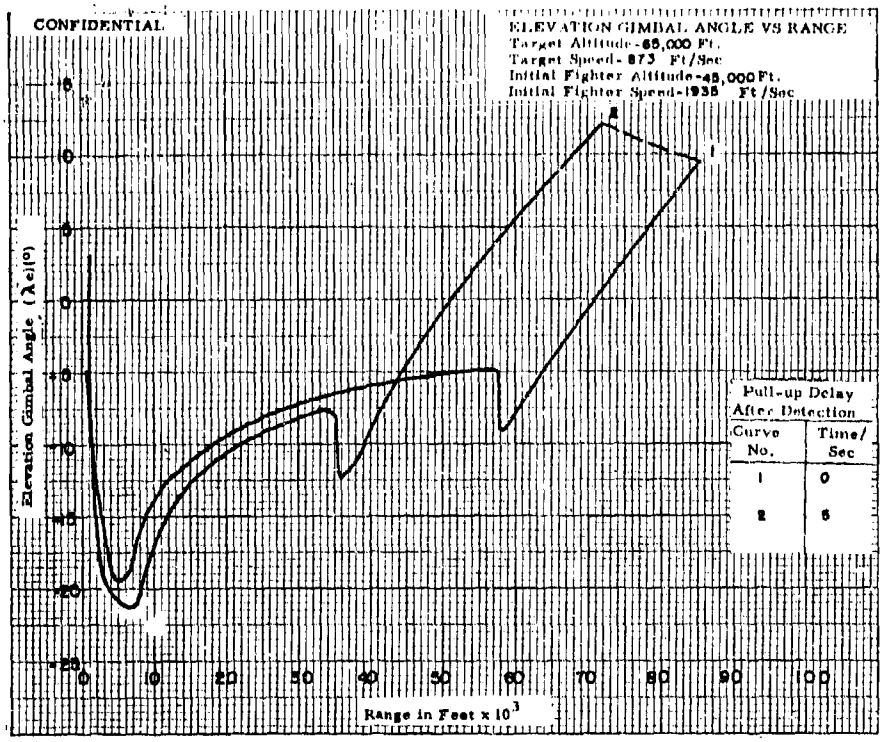
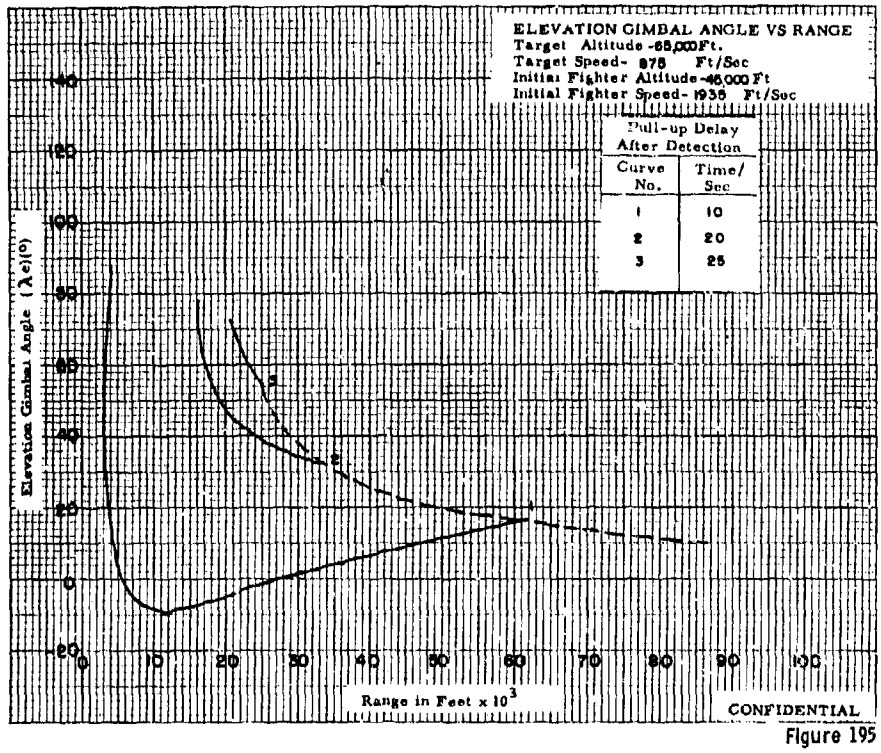

CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 25 Sec. After Detection
1000
0
-1000
-2000
-3000
-4000
Range Rate ($\dot{R}$) (Ft/Sec)
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 194

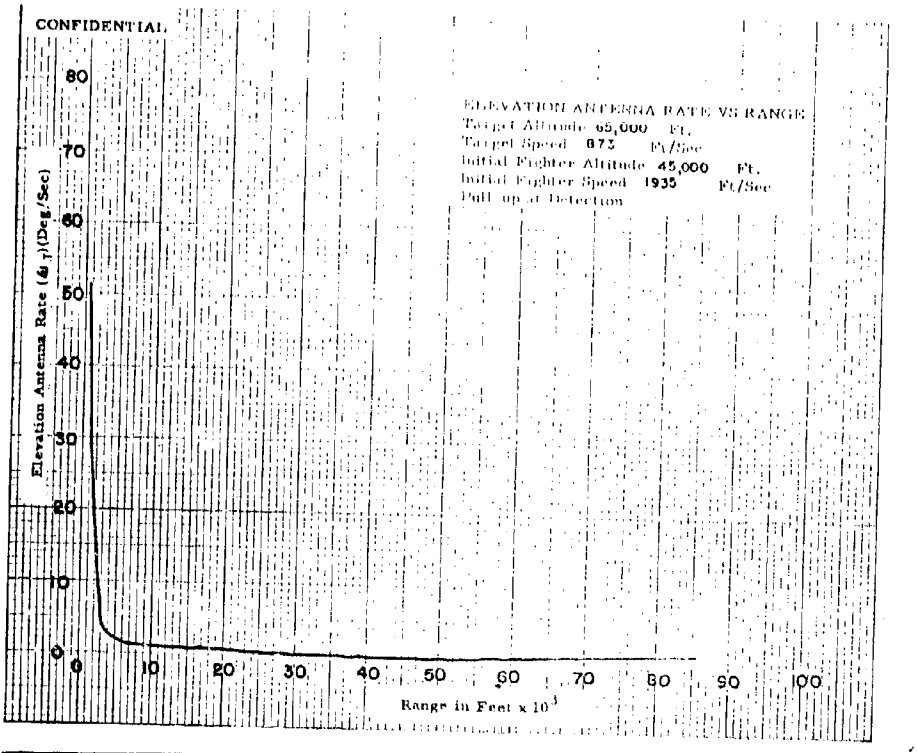
CONFIDENTIAL





CONFIDENTIAL

Figure 195


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull up at Detection
Elevation Antenna Rate ($\dot{\epsilon}_T$)(Deg/Sec)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90 100

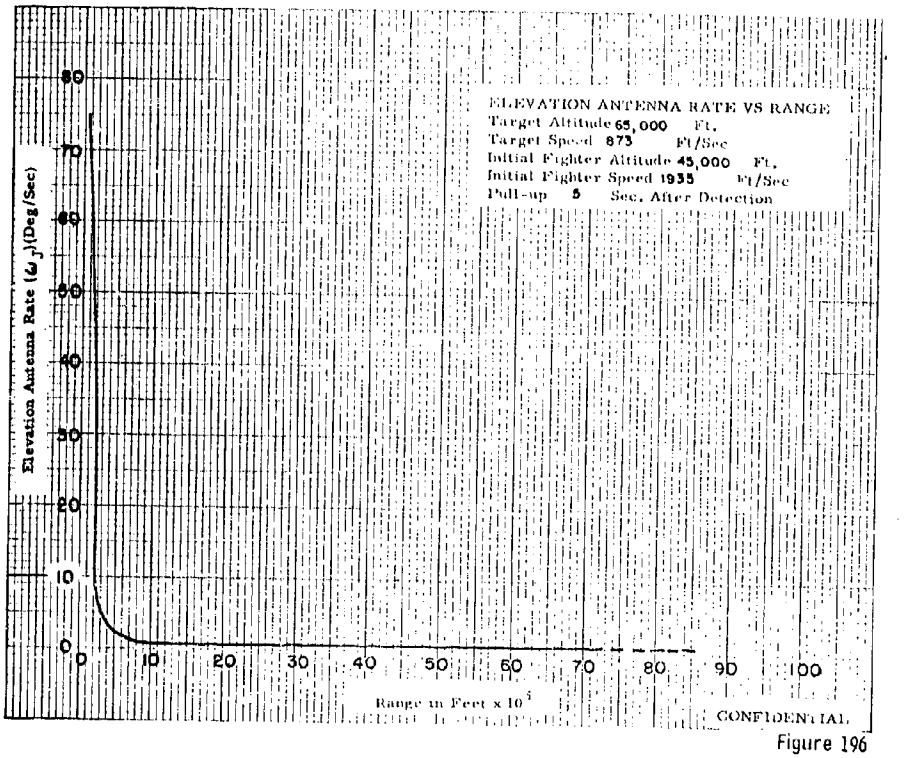

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Elevation Antenna Rate ($\dot{\epsilon}_T$)(Deg/Sec)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90 100

Figure 196

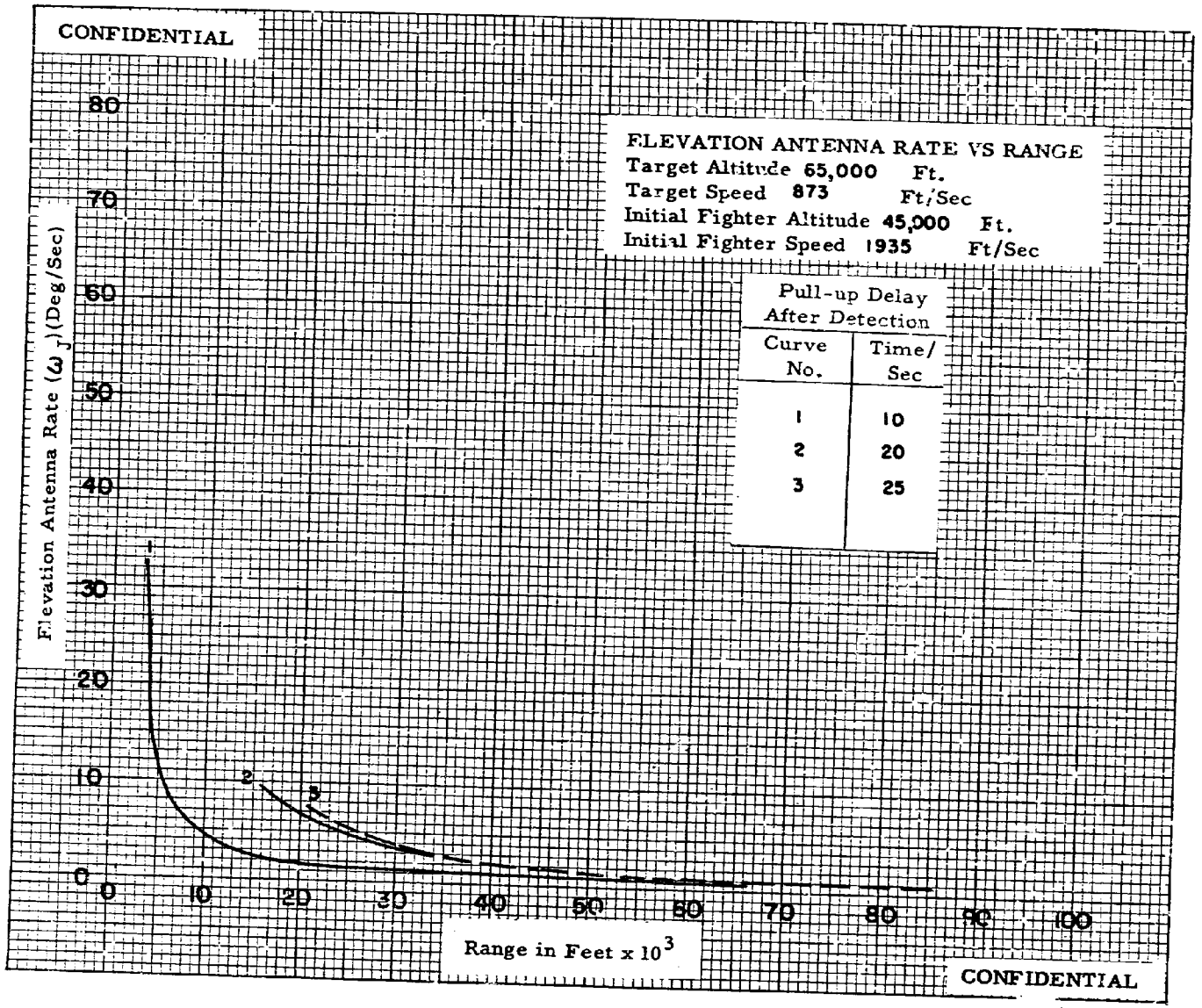
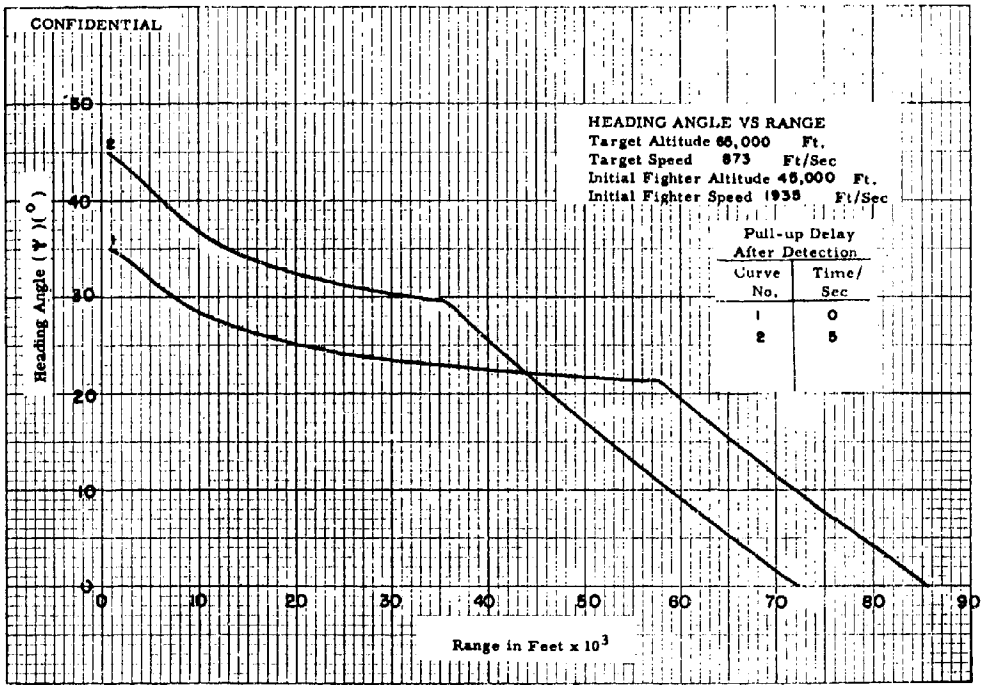

CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 10
2 | 20
3 | 25
Elevation Antenna Rate (ω_T) (Deg/Sec)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90 100
0 10 20 30 40 50 60 70 80
CONFIDENTIAL

Figure 197


CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1938 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 5
Heading Angle (Ψ)(°)
Range in Feet x 10³

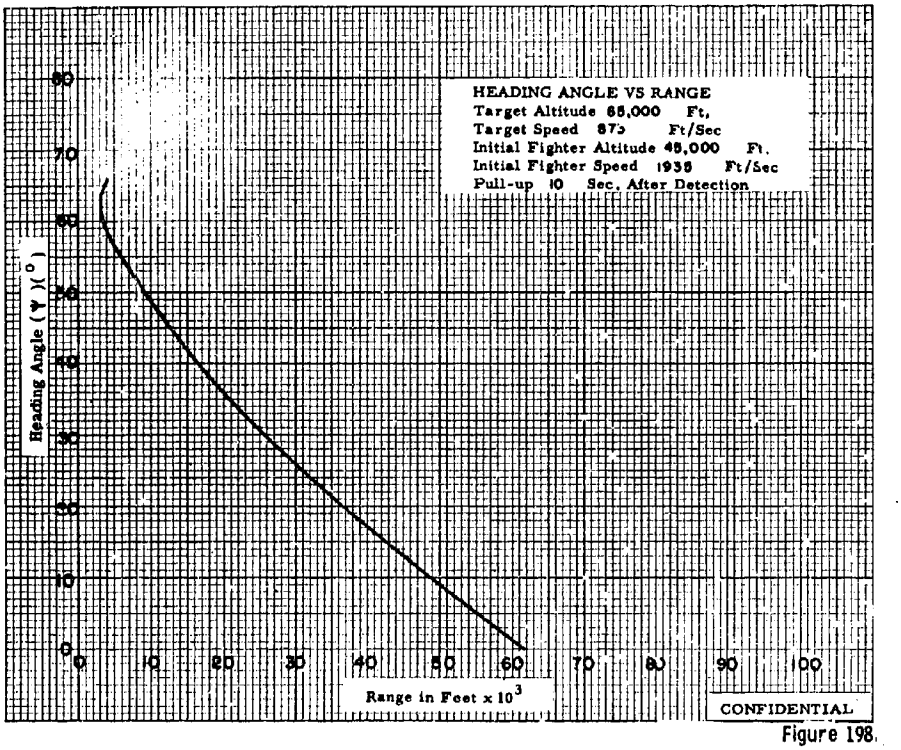

HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft,
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1938 Ft/Sec
Pull-up 10 Sec. After Detection
Heading Angle (Ψ)(°)
Range in Feet x 10³
CONFIDENTIAL

Figure 198.

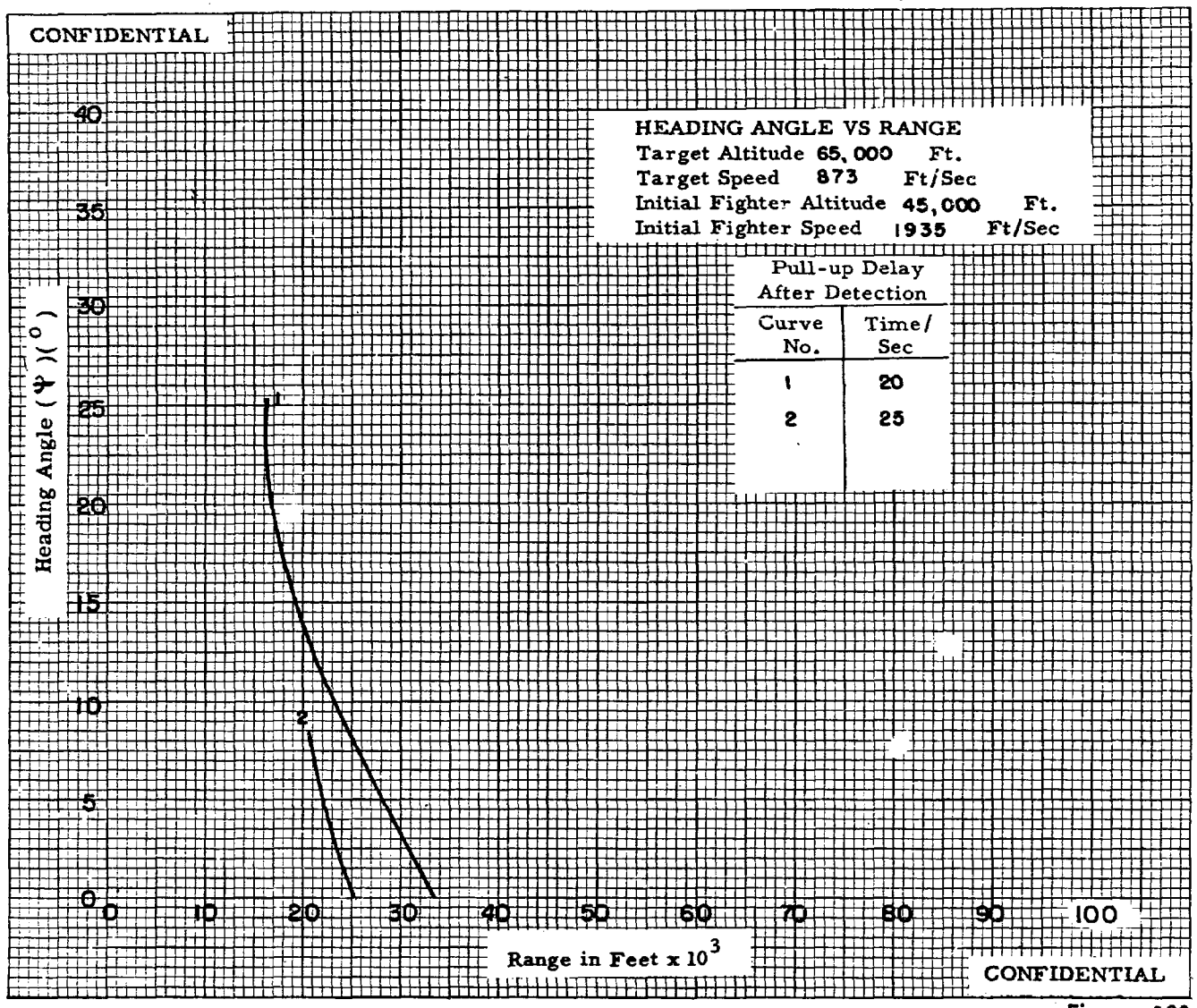
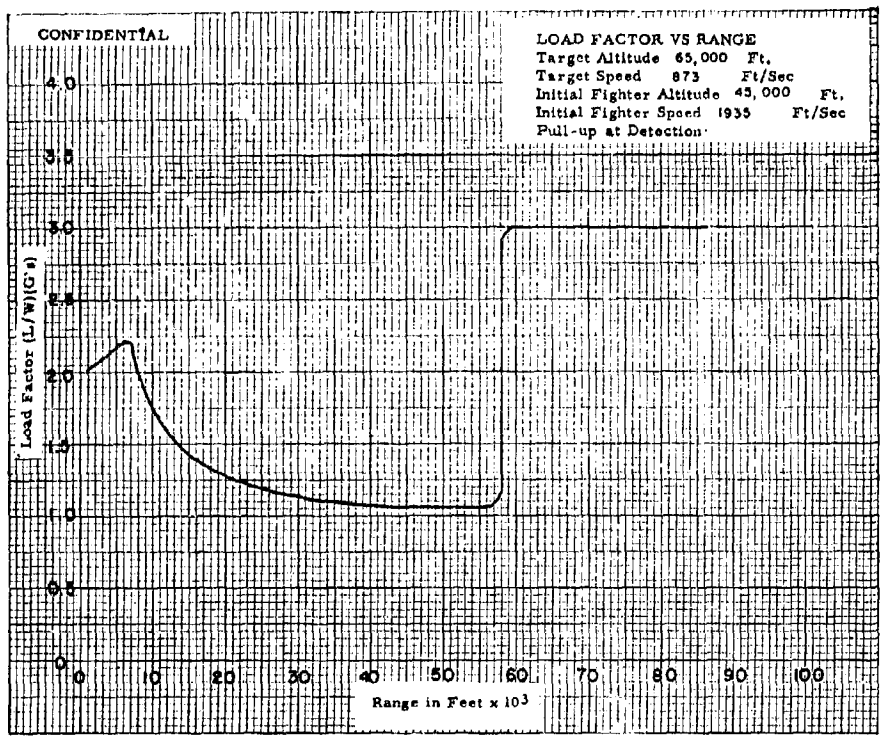

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 20
2 | 25
Heading Angle (Ψ)(°)
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
1
2
Range in Feet x 10^3
CONFIDENTIAL

Figure 199


LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

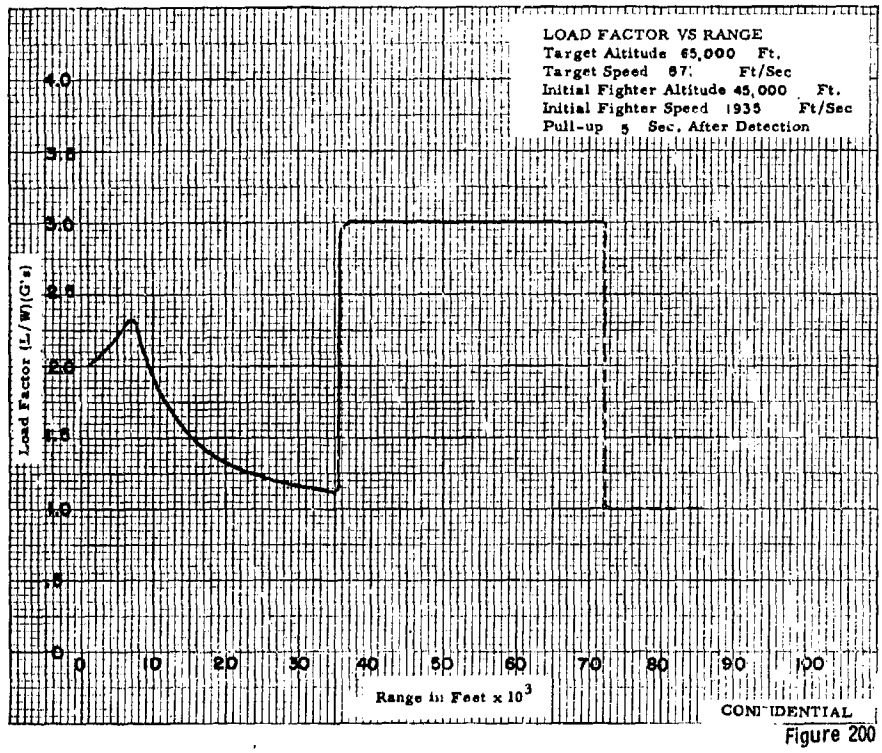
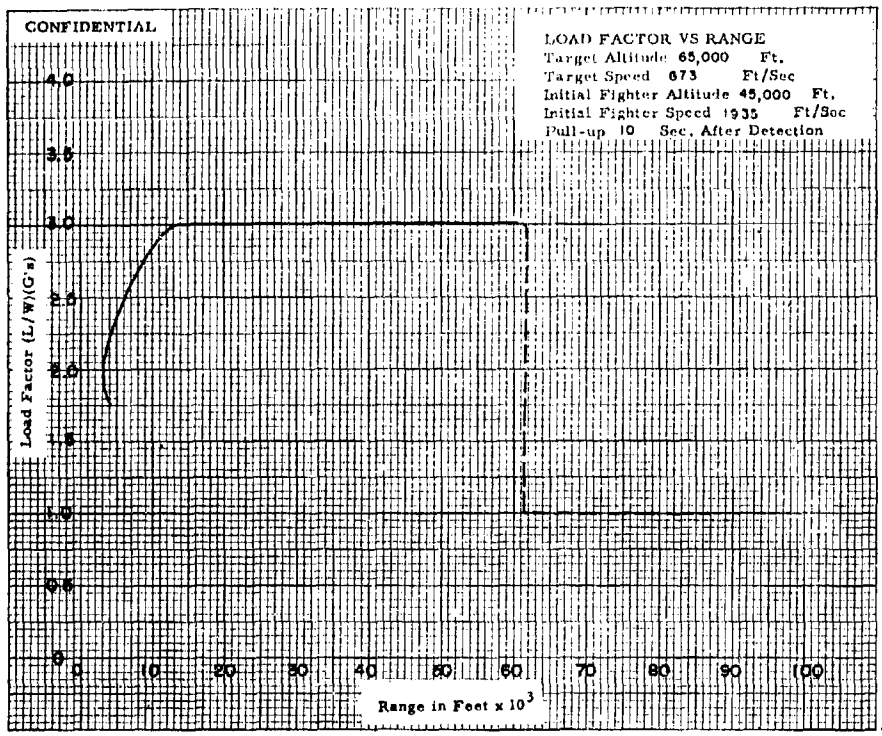

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 87 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

Figure 200


LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

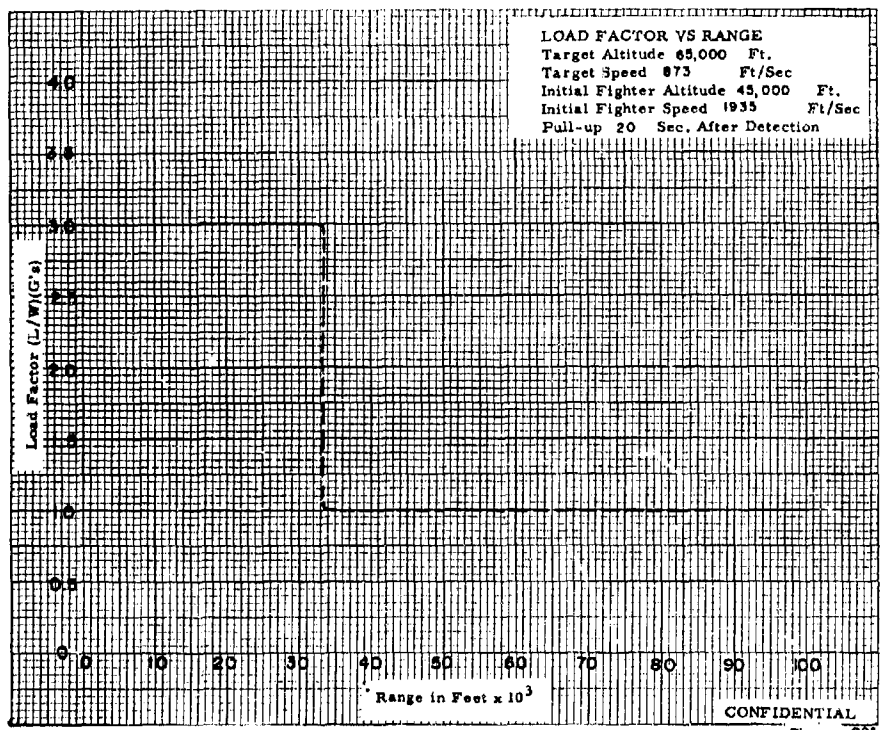

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 20 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

Figure 201

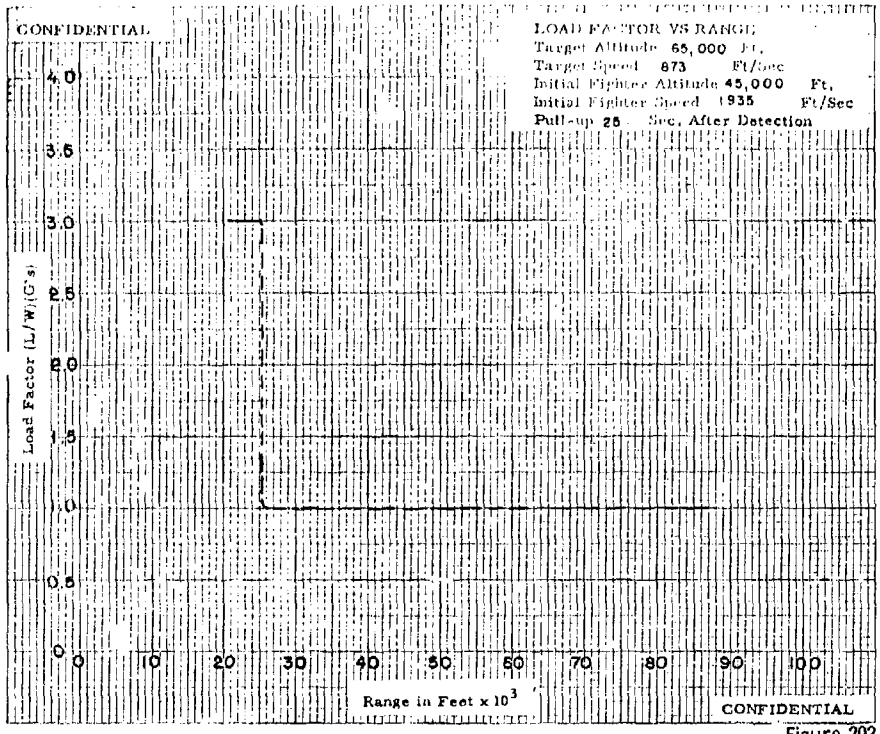


Figure 202

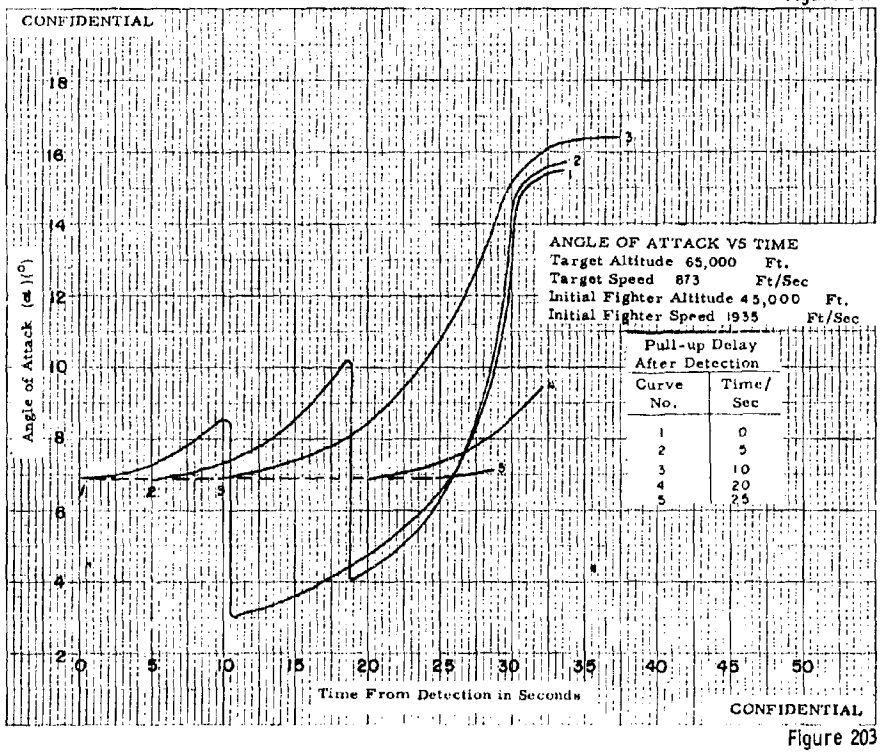
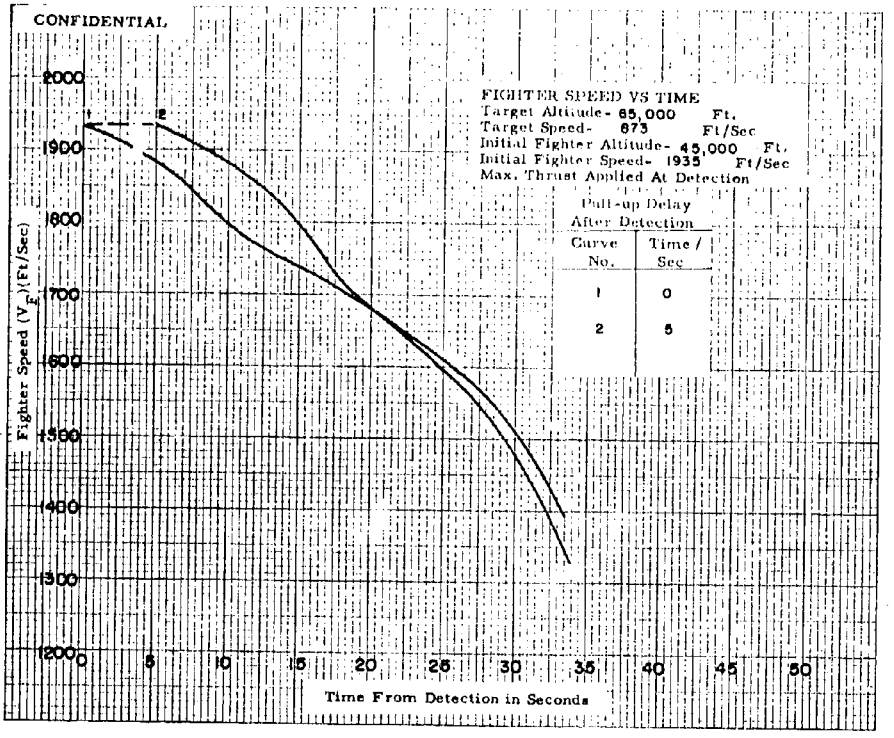


Figure 203


CONFIDENTIAL
FIGHTER SPEED VS TIME
Target Altitude- 65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 45,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time / Sec
1 | 0
2 | 5
Fighter Speed (V_F)(Ft/Sec)
2000
1900
1800
1700
1600
1500
1400
1300
1200
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds

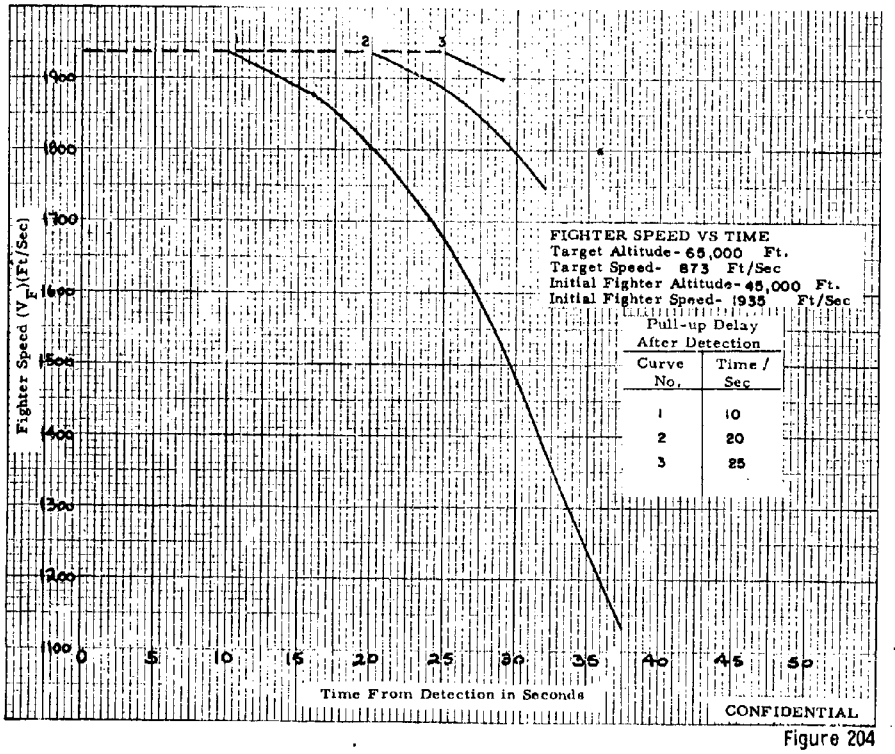
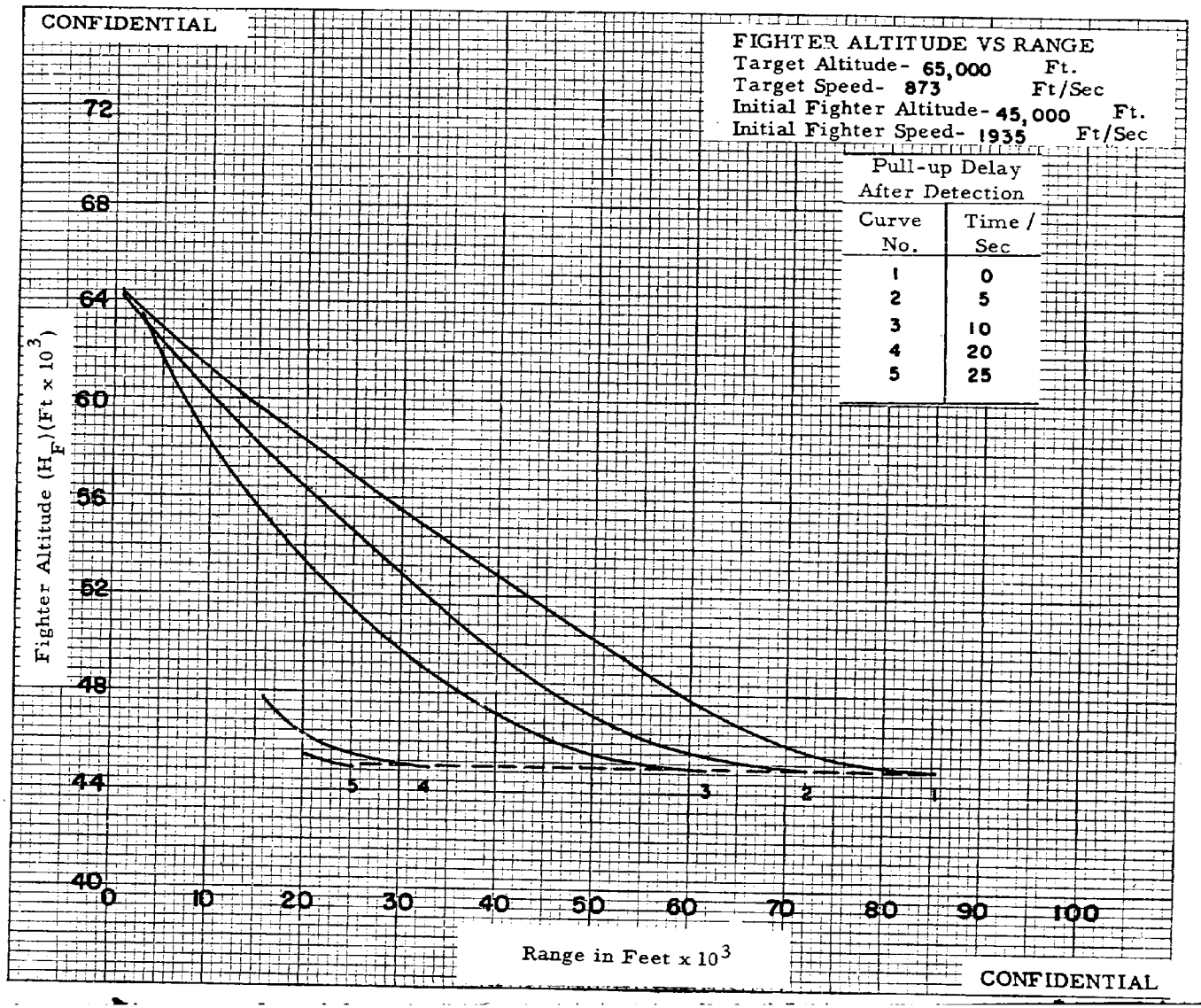
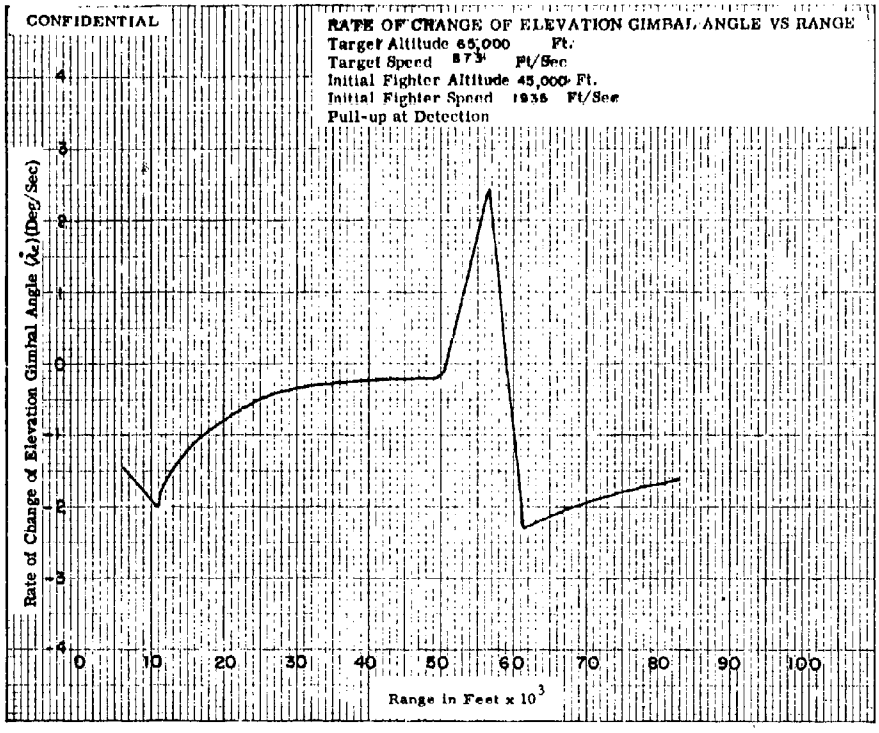

FIGHTER SPEED VS TIME
Target Altitude- 65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 45,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time / Sec
1 | 10
2 | 20
3 | 25
Fighter Speed (V_F)(Ft/Sec)
1900
1800
1700
1600
1500
1400
1300
1200
1100
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds
CONFIDENTIAL

Figure 204

CONFIDENTIAL



CONFIDENTIAL


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1936 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_E$)(Deg/Sec)
4
3
2
1
0
-1
-2
-3
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

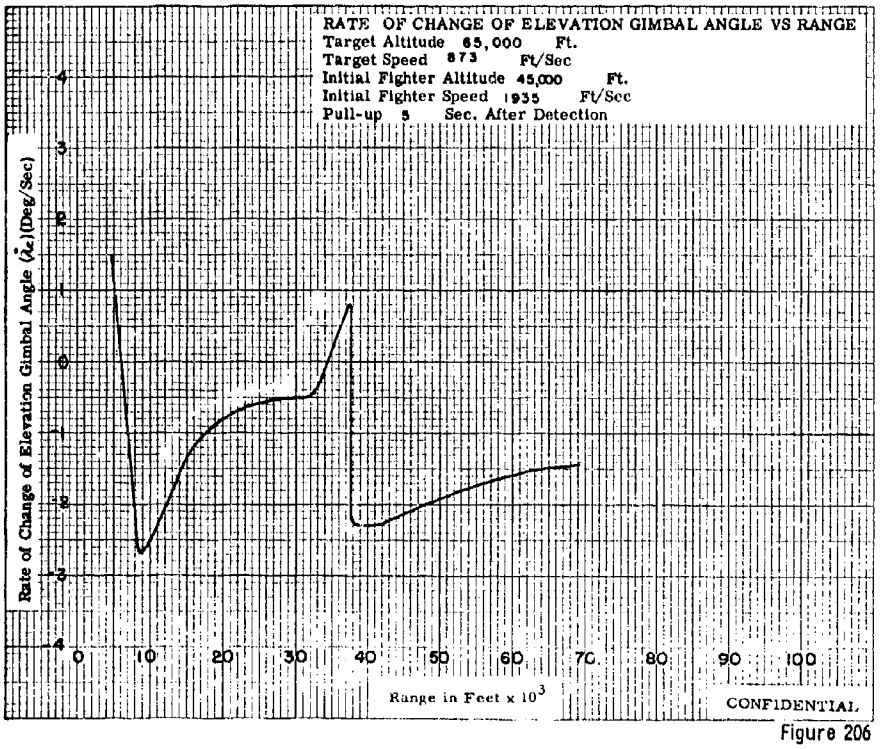
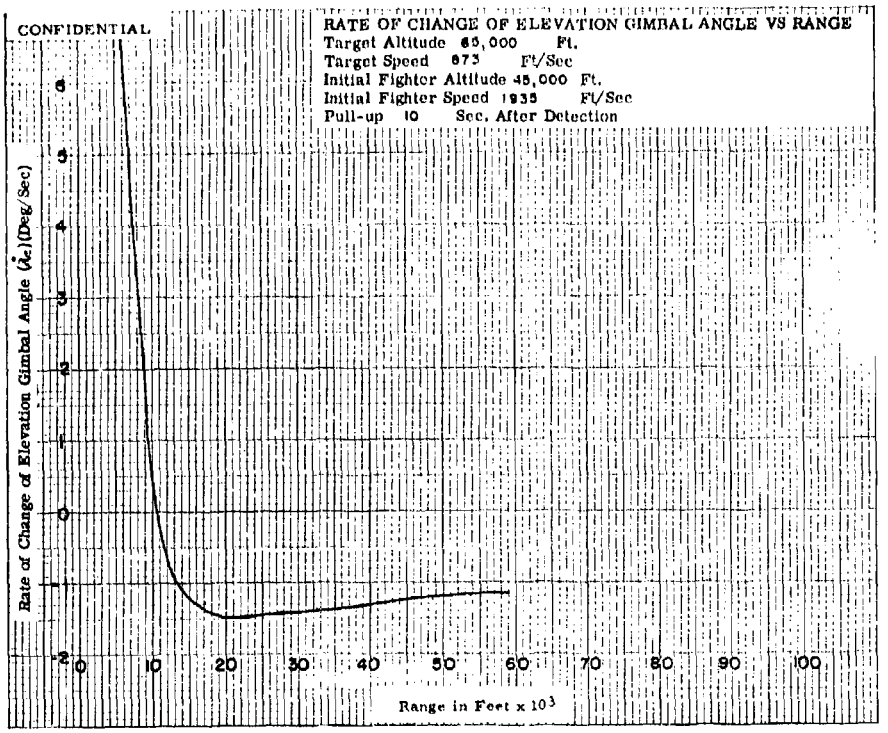

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_E$)(Deg/Sec)
4
3
2
1
0
-1
-2
-3
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 206


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (ε̇e)(Deg/Sec)
6
5
4
3
2
1
0
-1
-2
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

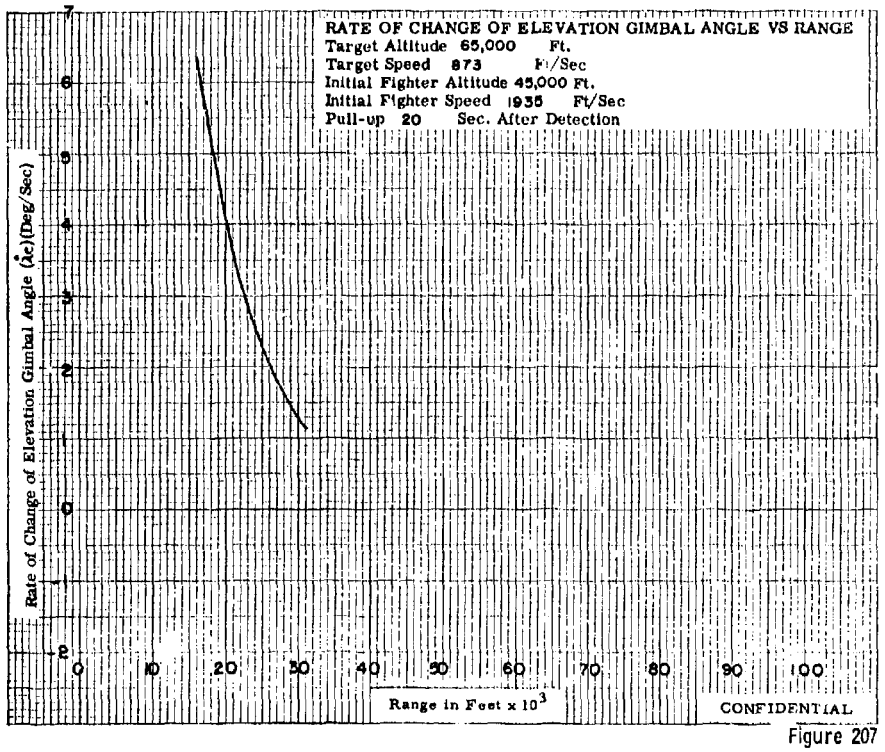

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 20 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (ε̇e)(Deg/Sec)
7
6
5
4
3
2
1
0
-1
-2
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 207

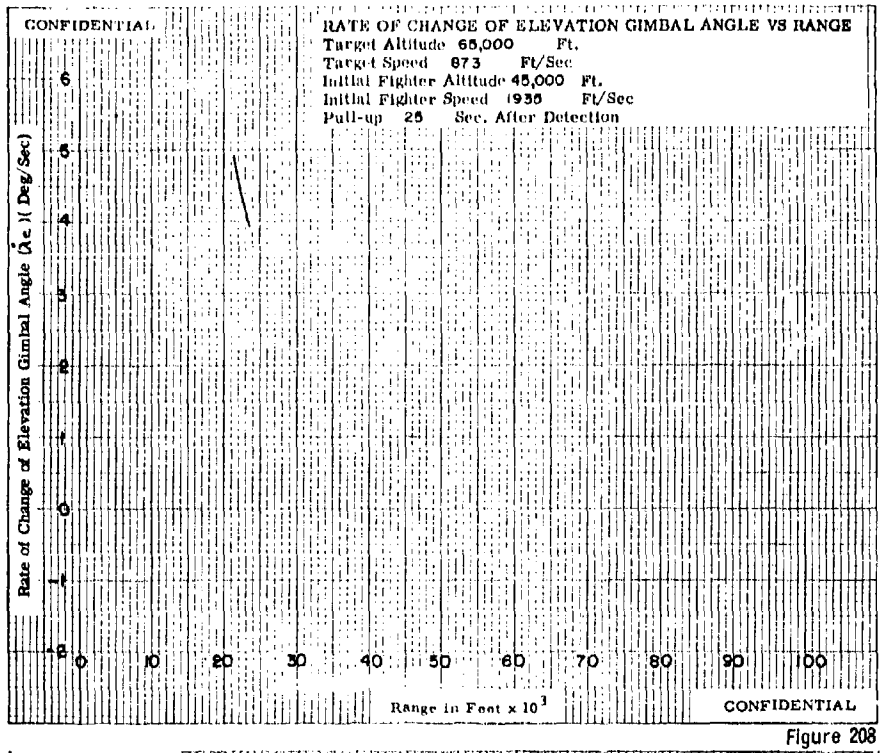


Figure 208

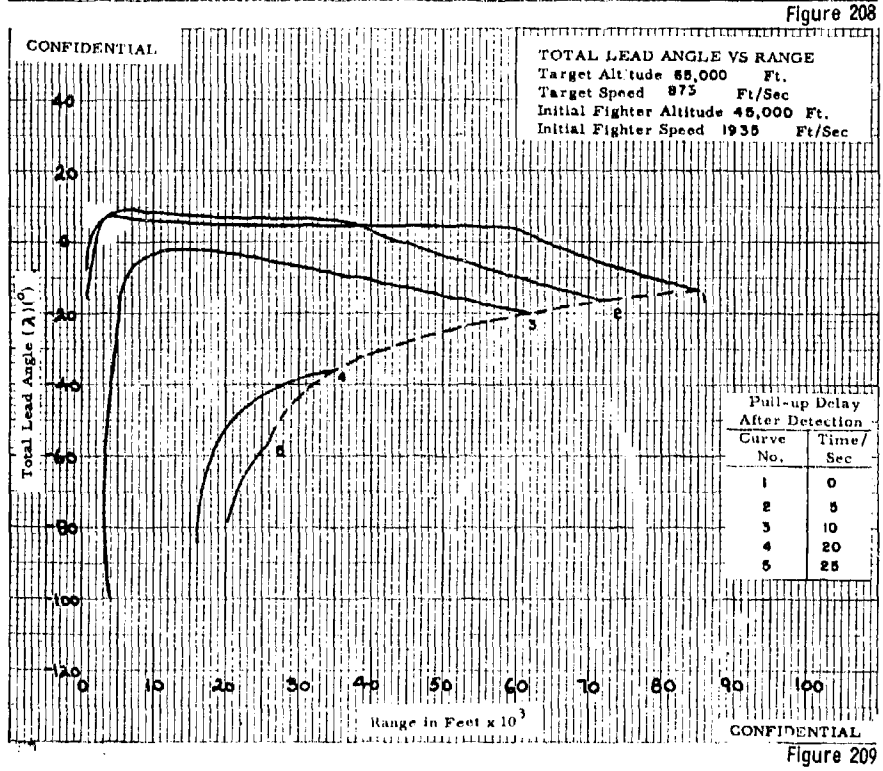
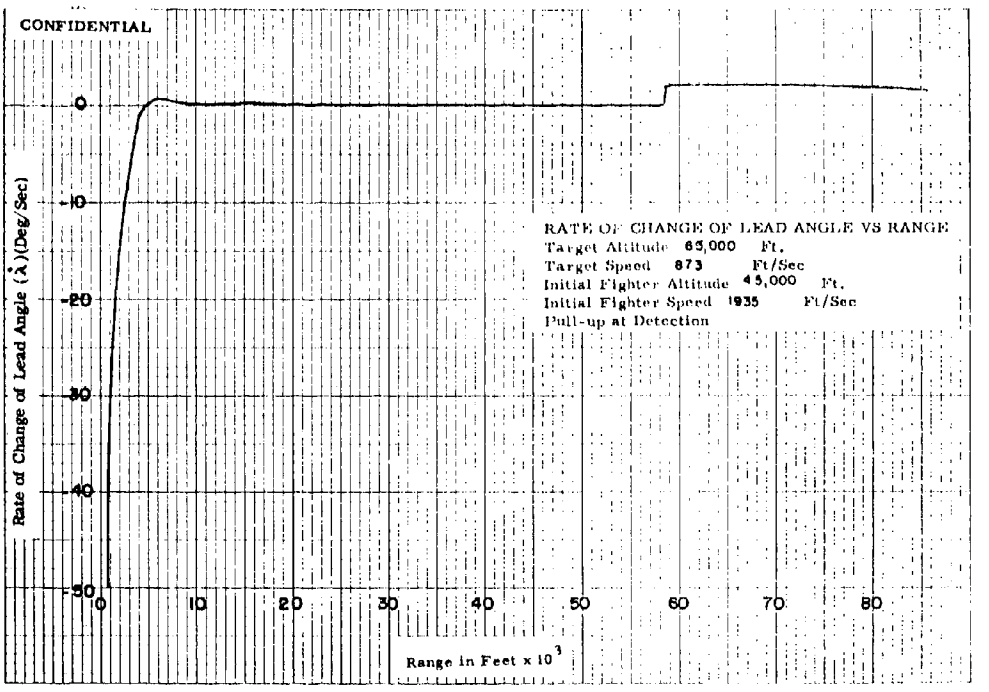


Figure 209


CONFIDENTIAL
Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection

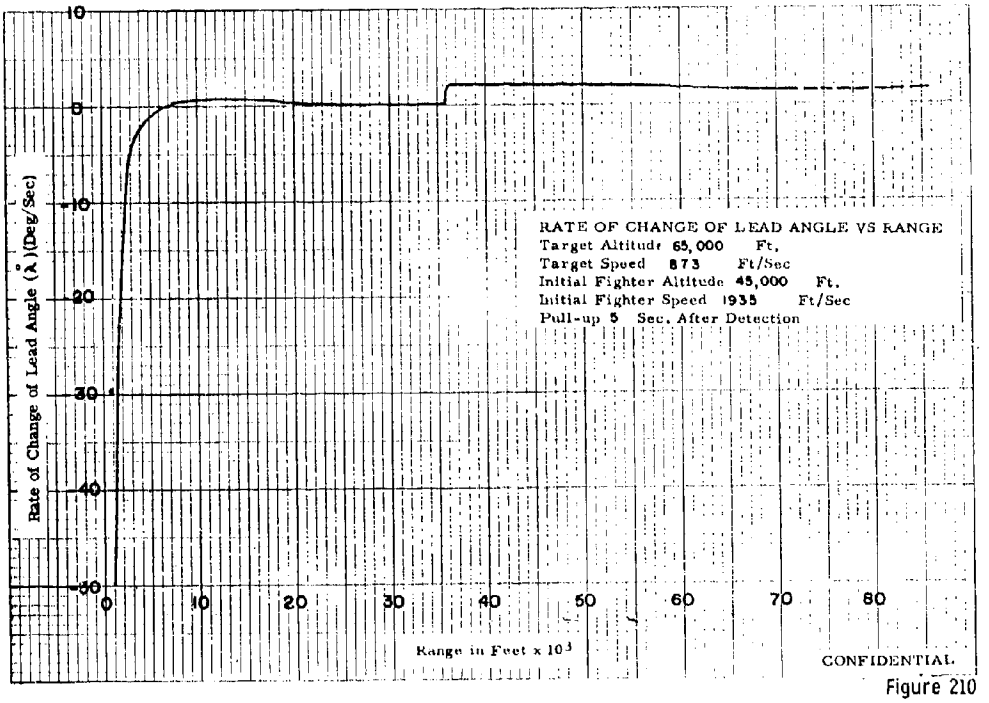
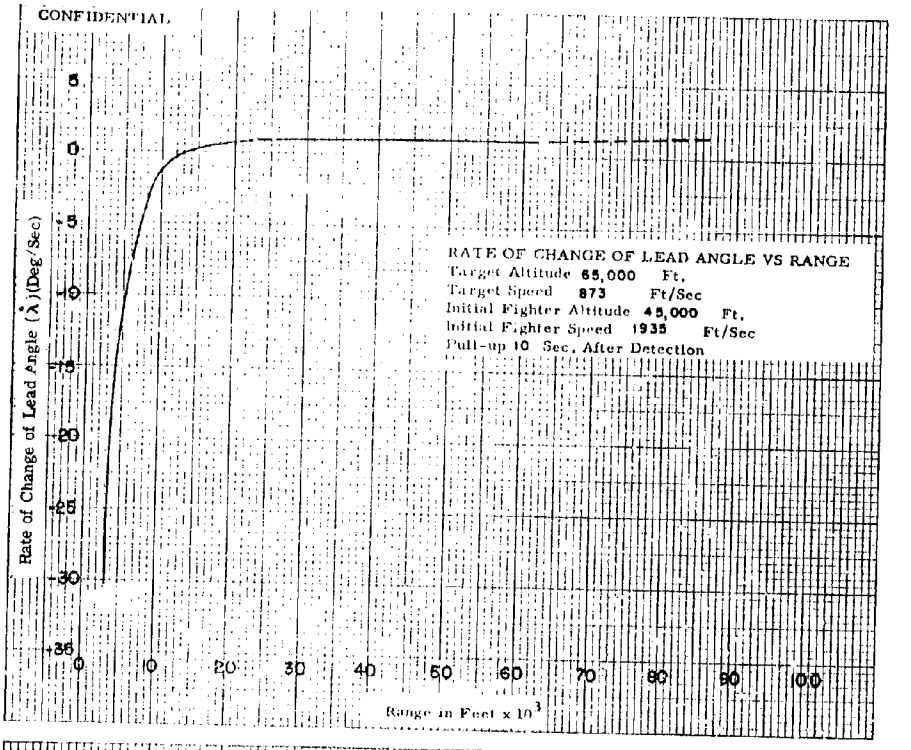

Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
10
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
CONFIDENTIAL

Figure 210


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
Range in Feet x 10³

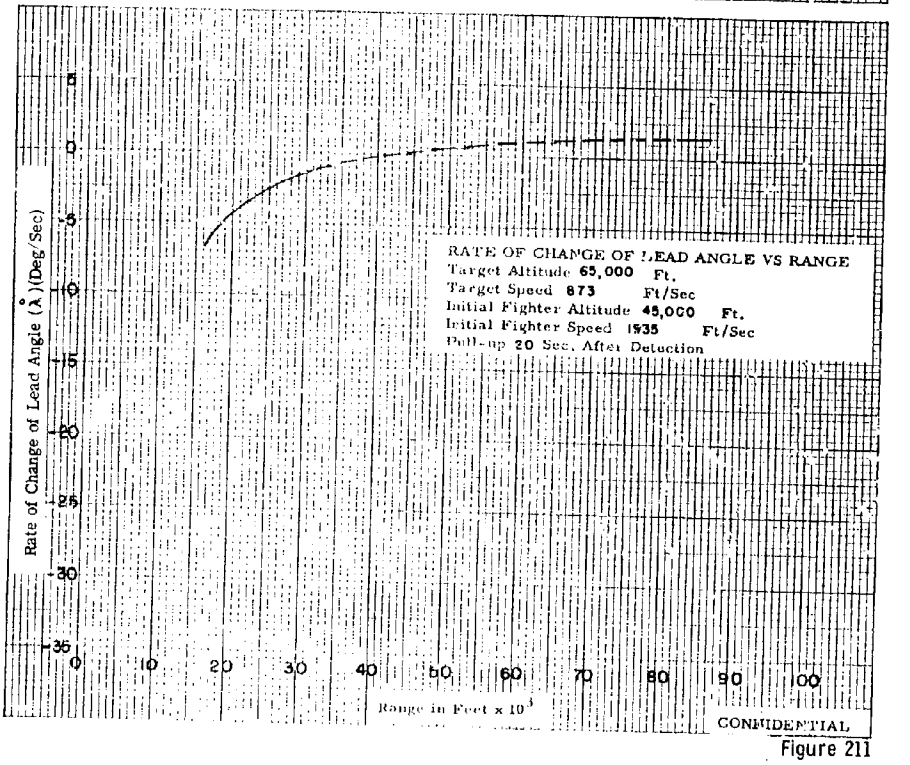
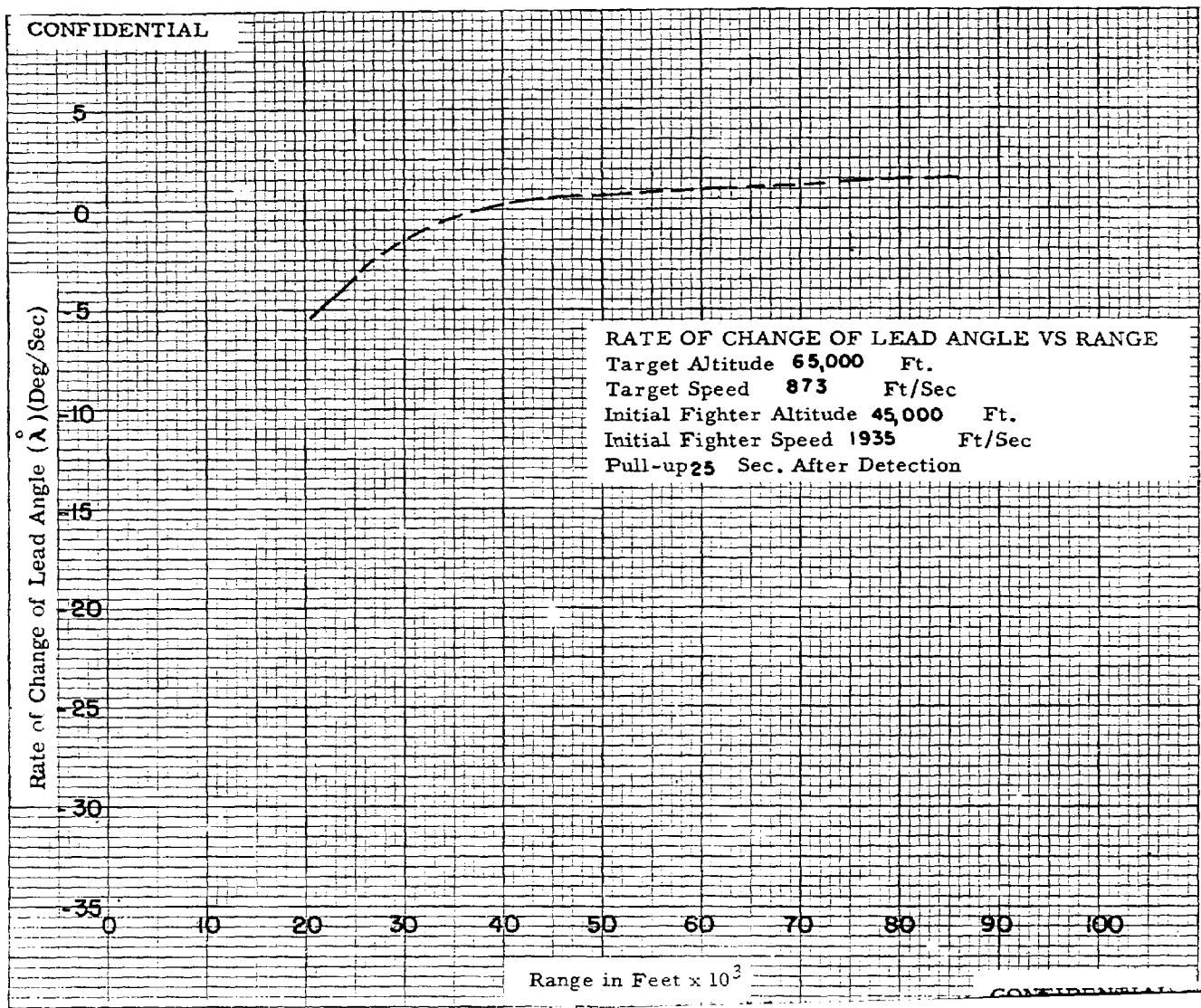
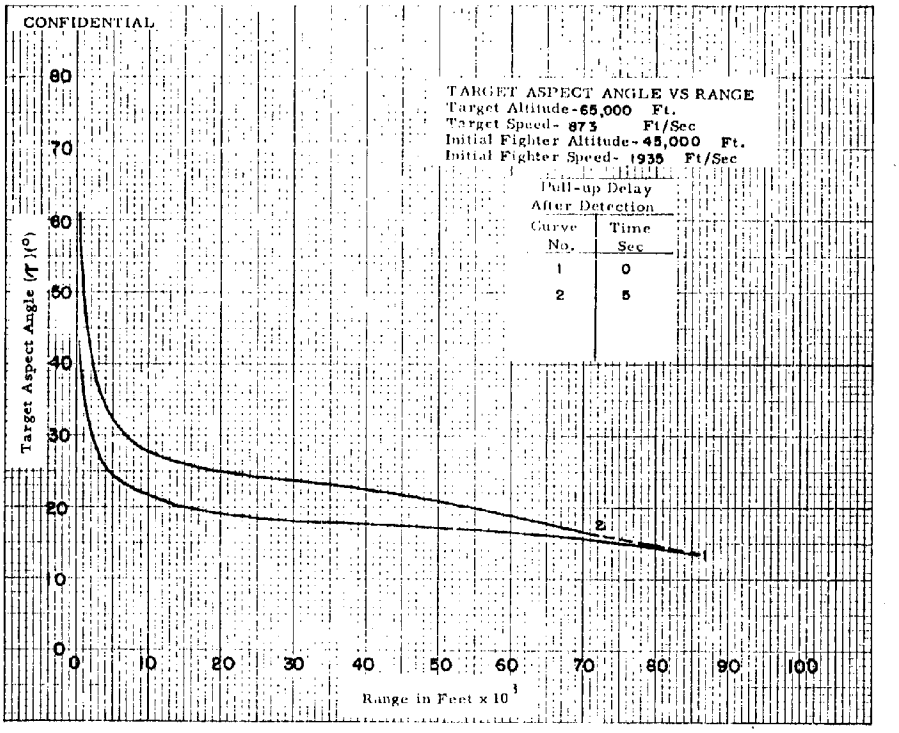

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 20 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
Range in Feet x 10³

Figure 211


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 25 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
5
0
-5
-10
-15
-20
-25
-30
-35
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³


CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-45,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time Sec
1 | 0
2 | 5
Target Aspect Angle (T)(°)
Range in Feet x 10³
0 10 20 30 40 50 60 70 80 90 100
0 10 20 30 40 50 60 70 80

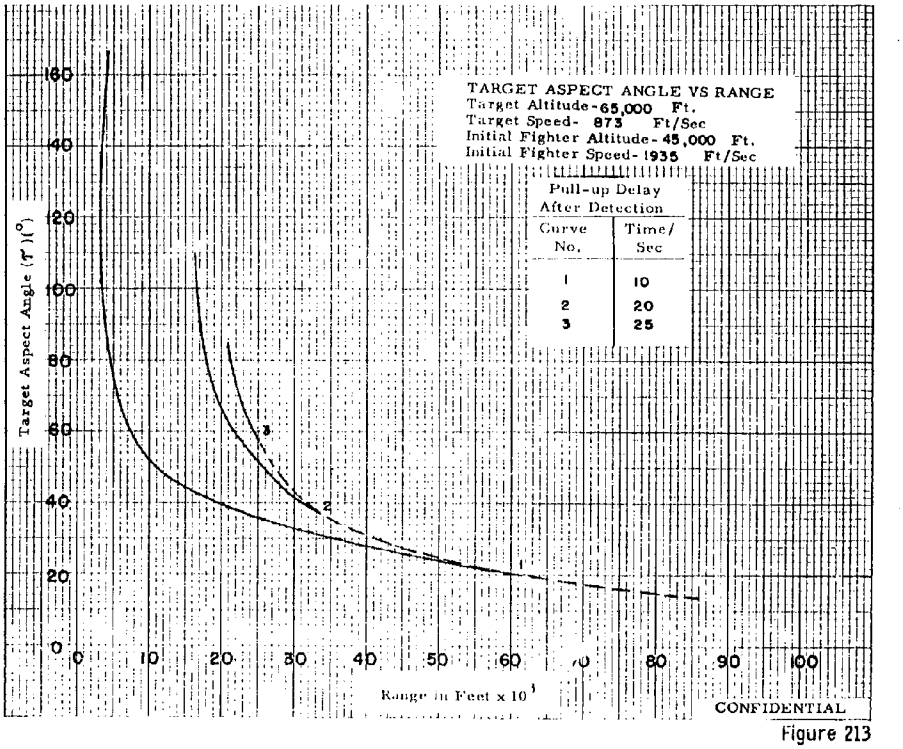
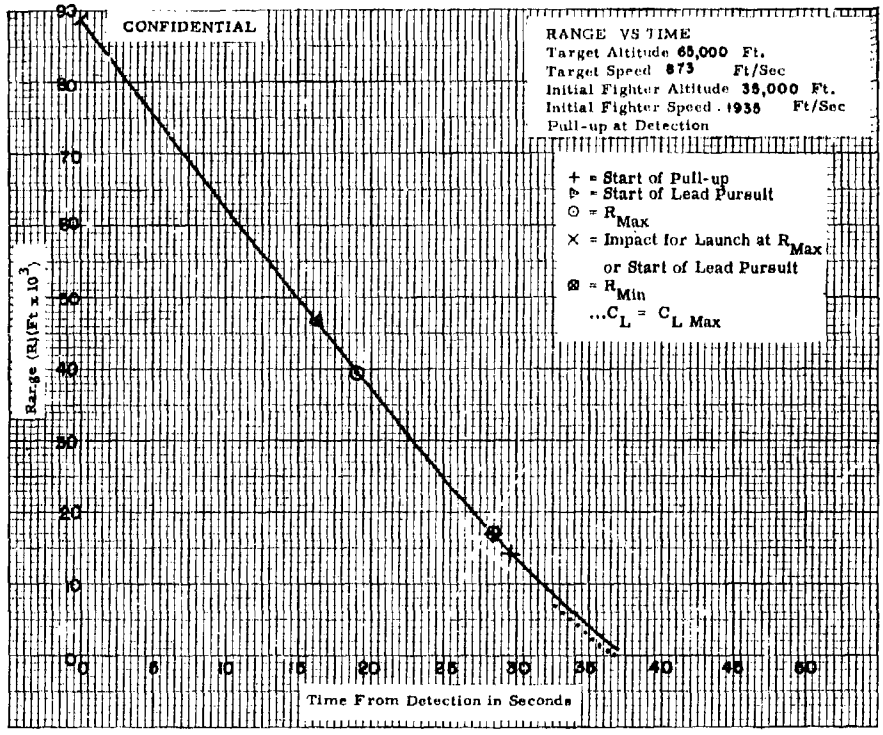

TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-45,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 10
2 | 20
3 | 25
Target Aspect Angle (T)(°)
Range in Feet x 10³
0 10 20 30 40 50 60 70 80 90 100
0 20 40 60 80 100 120 140 160
CONFIDENTIAL

Figure 213


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

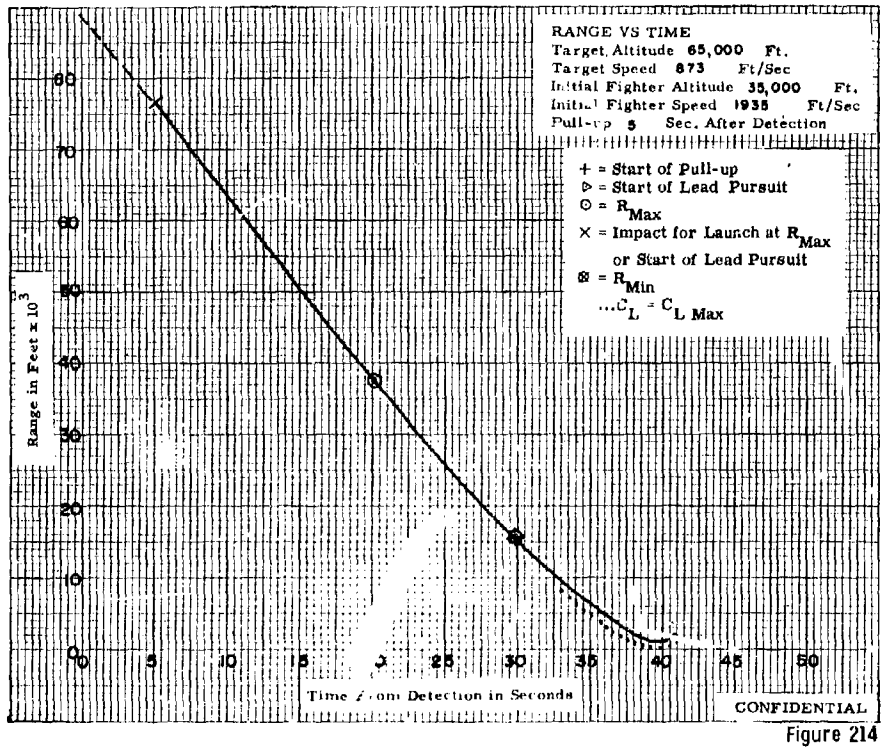

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range in Feet x 10^3
Time From Detection in Seconds
CONFIDENTIAL

Figure 214

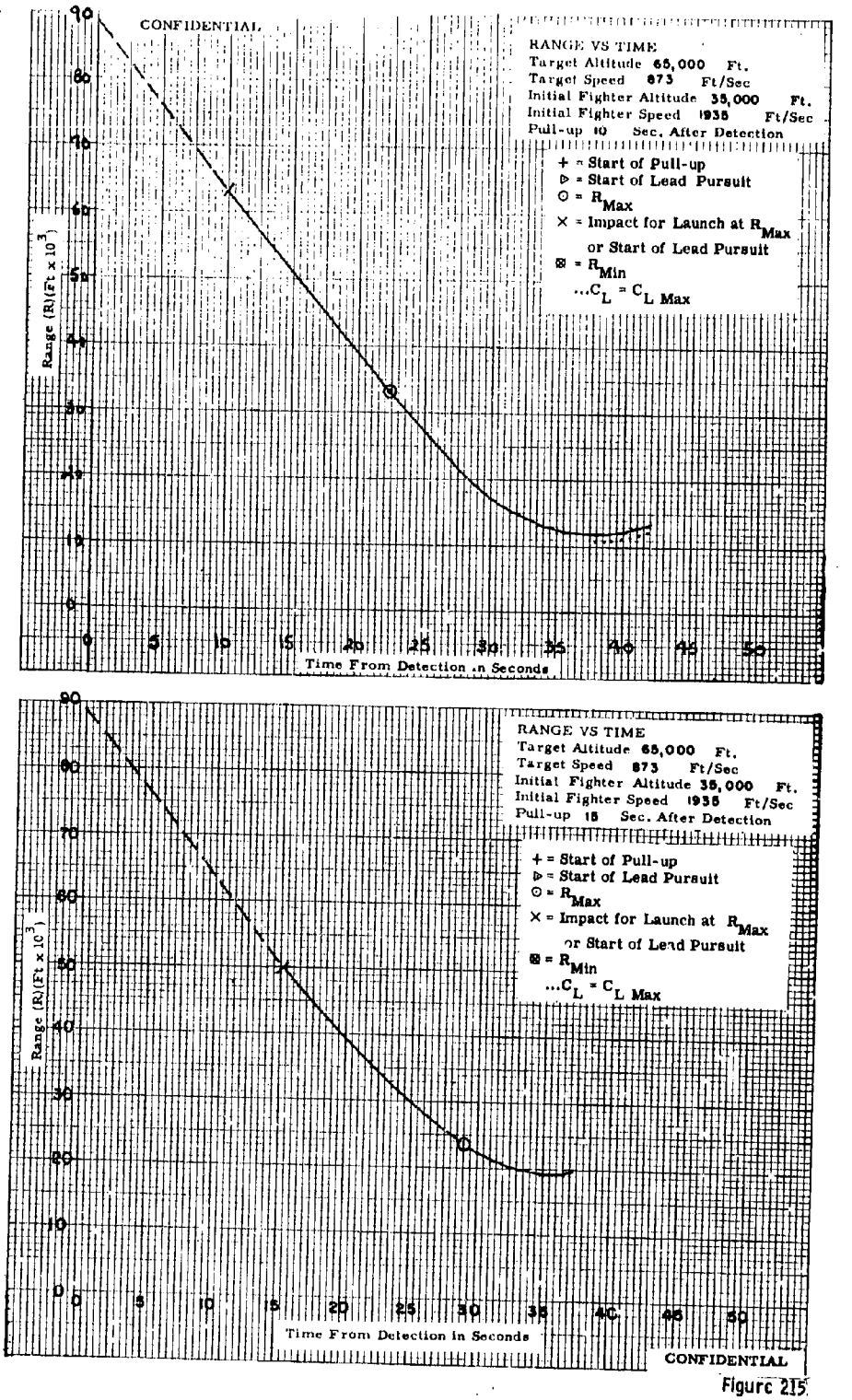
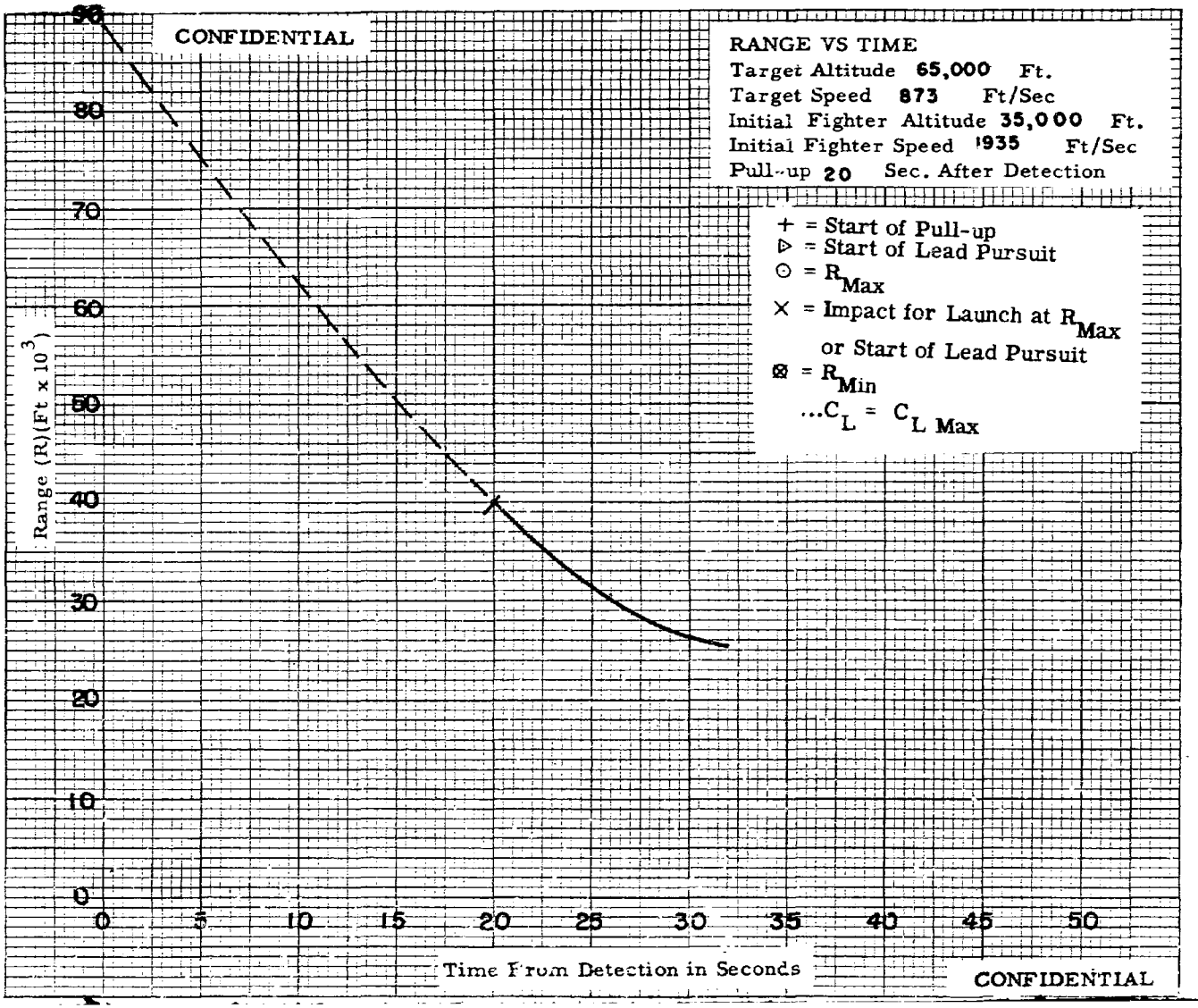
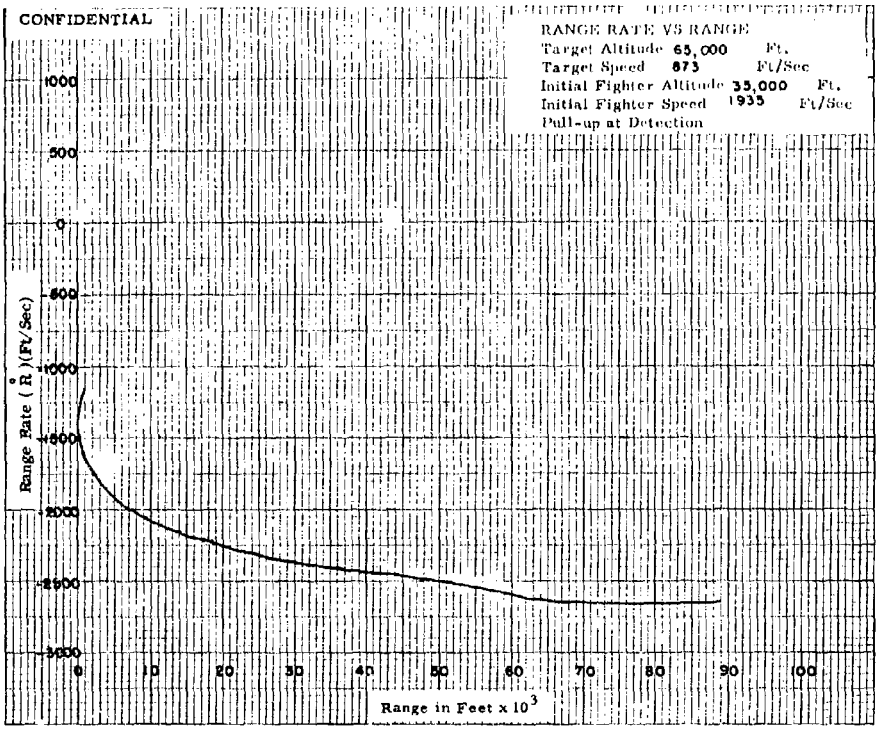

CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 215


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 20 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊠ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
CONFIDENTIAL


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

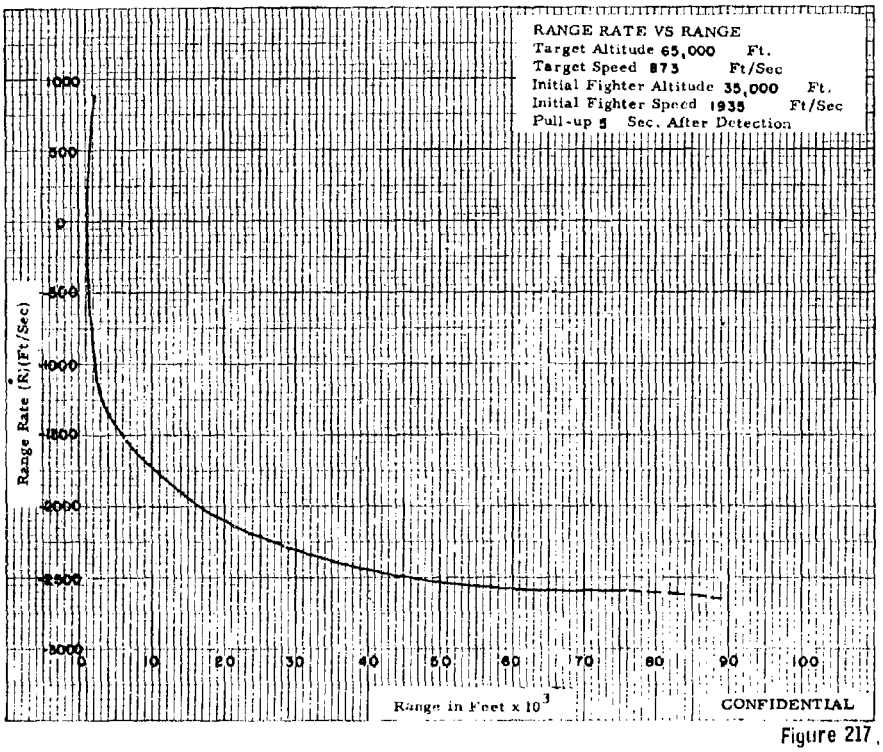
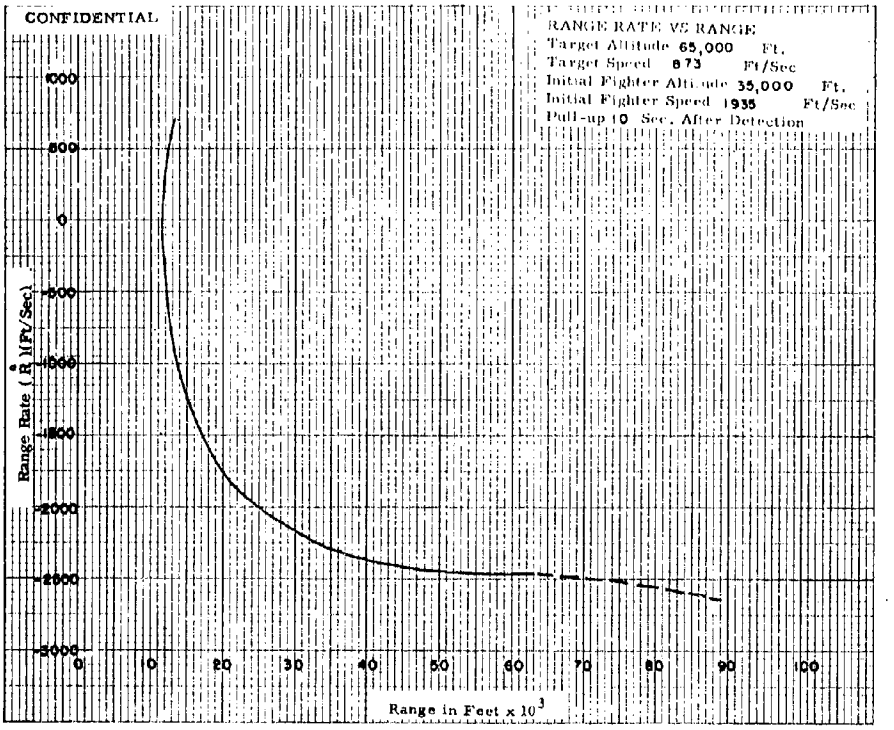

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 217.


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

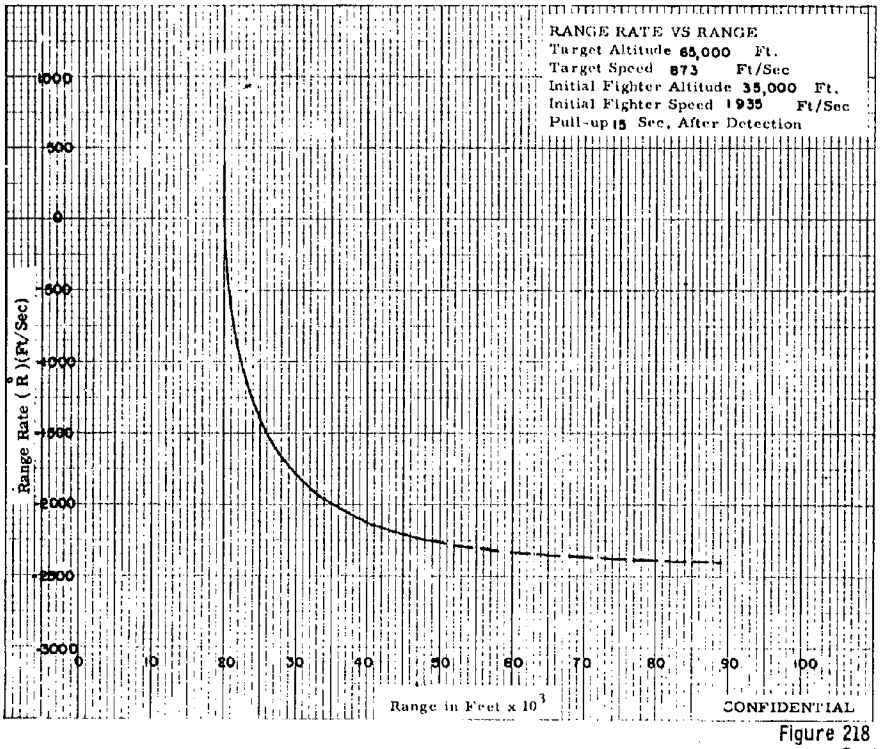

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 218

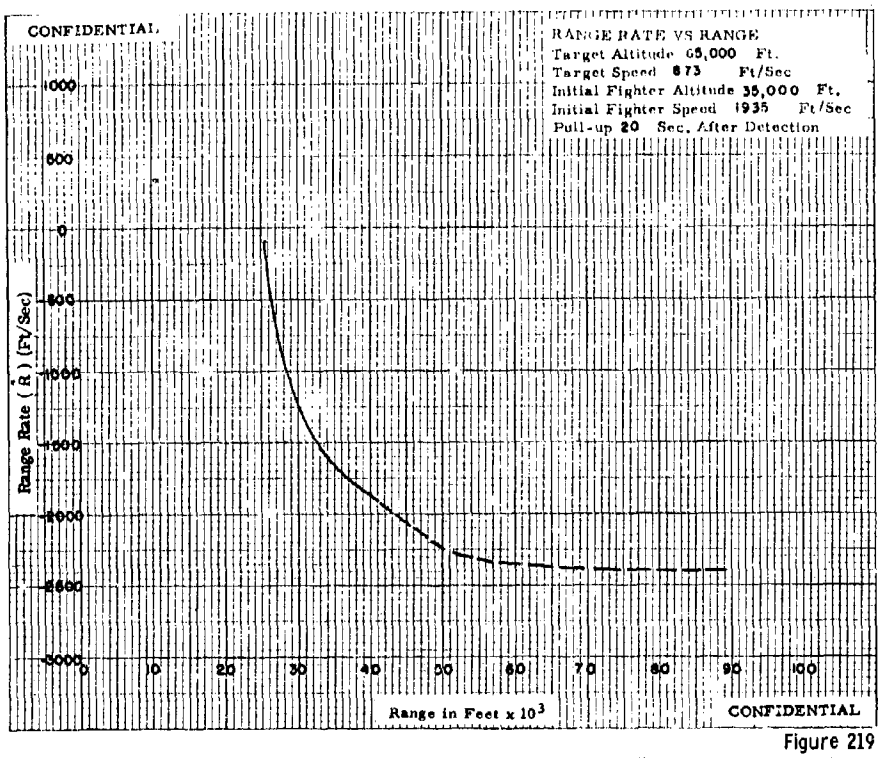


Figure 219

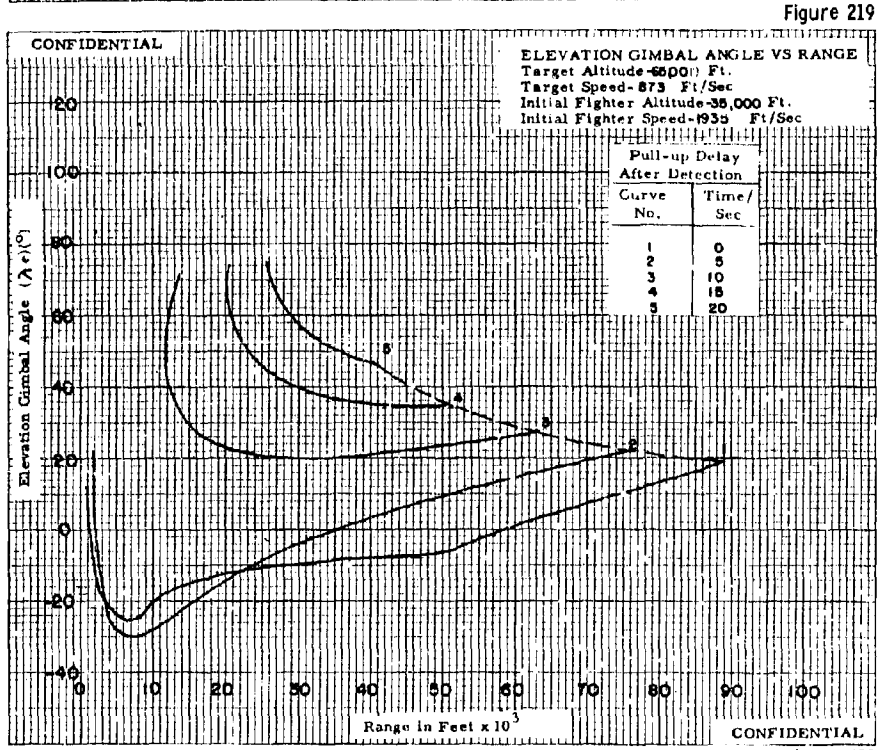
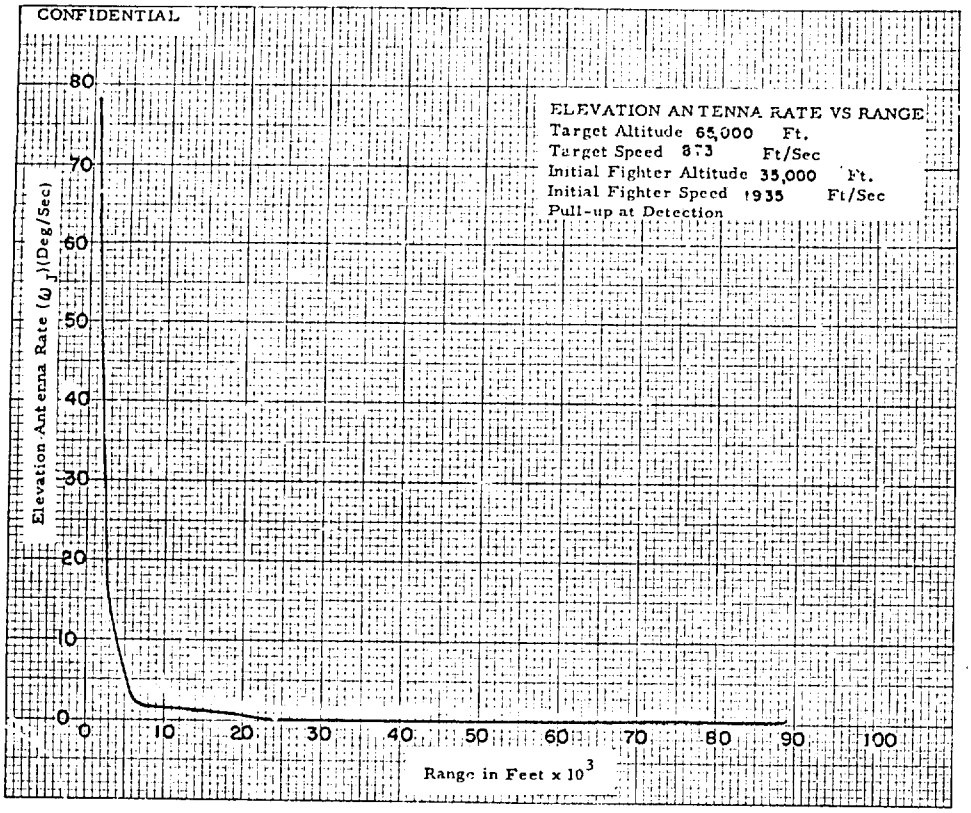


Figure 220


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Elevation Antenna Rate (ω_E)(Deg/Sec)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90
100

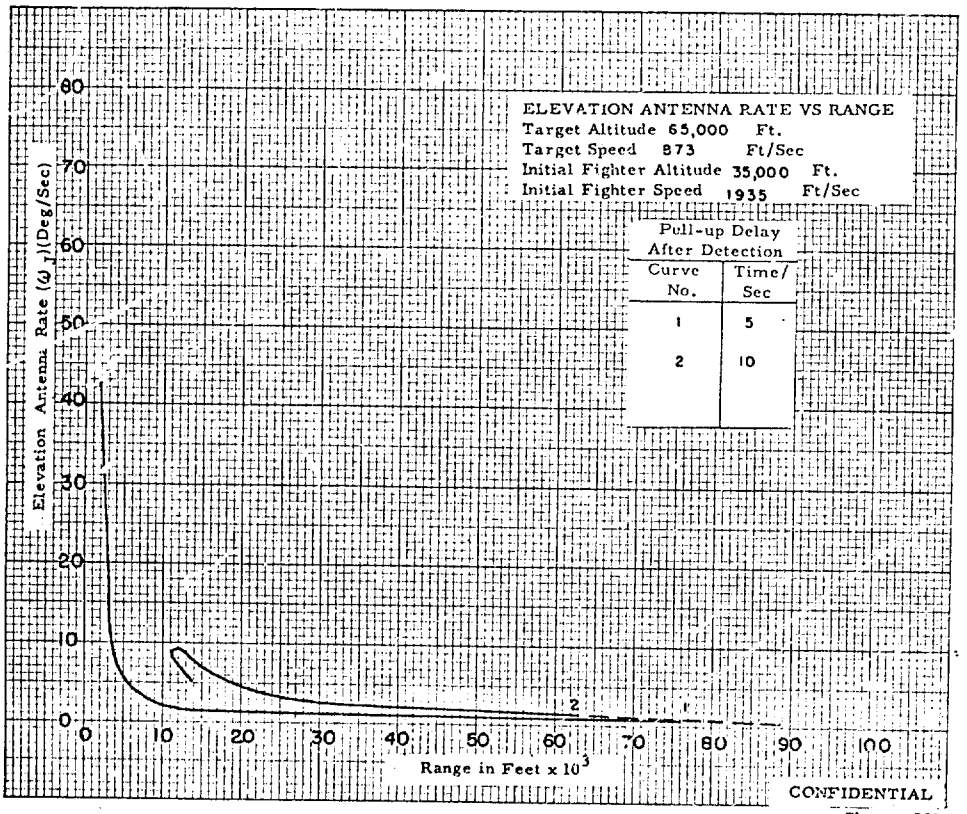

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 5
2 | 10
Elevation Antenna Rate (ω_E)(Deg/Sec)
Range in Feet x 10^3
2
0
10
20
30
40
50
60
70
80
90
100

Figure 221

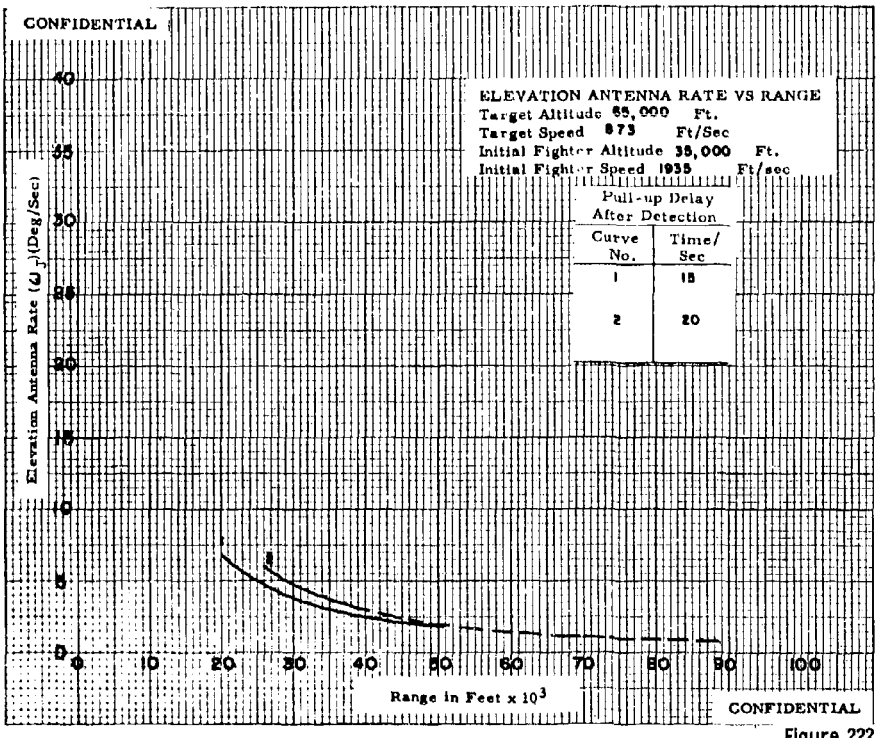


Figure 222

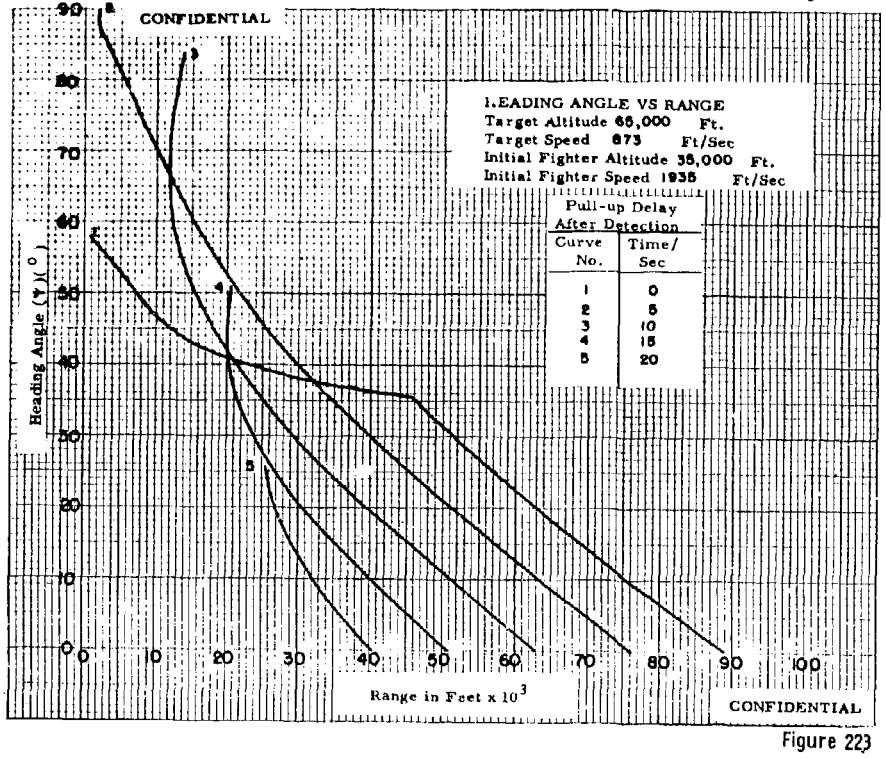
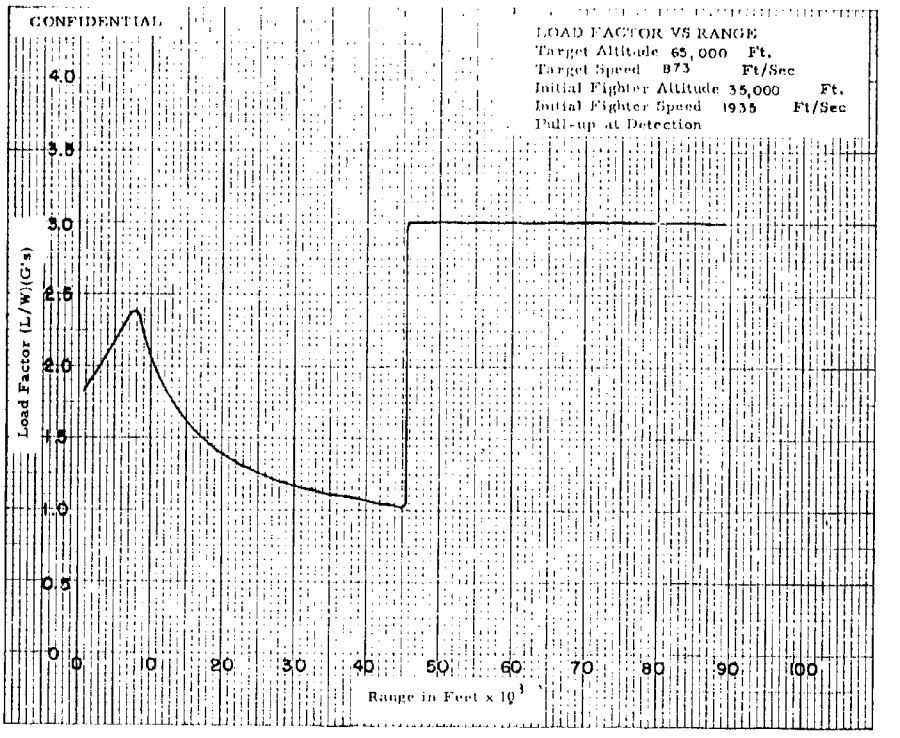


Figure 223


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10³

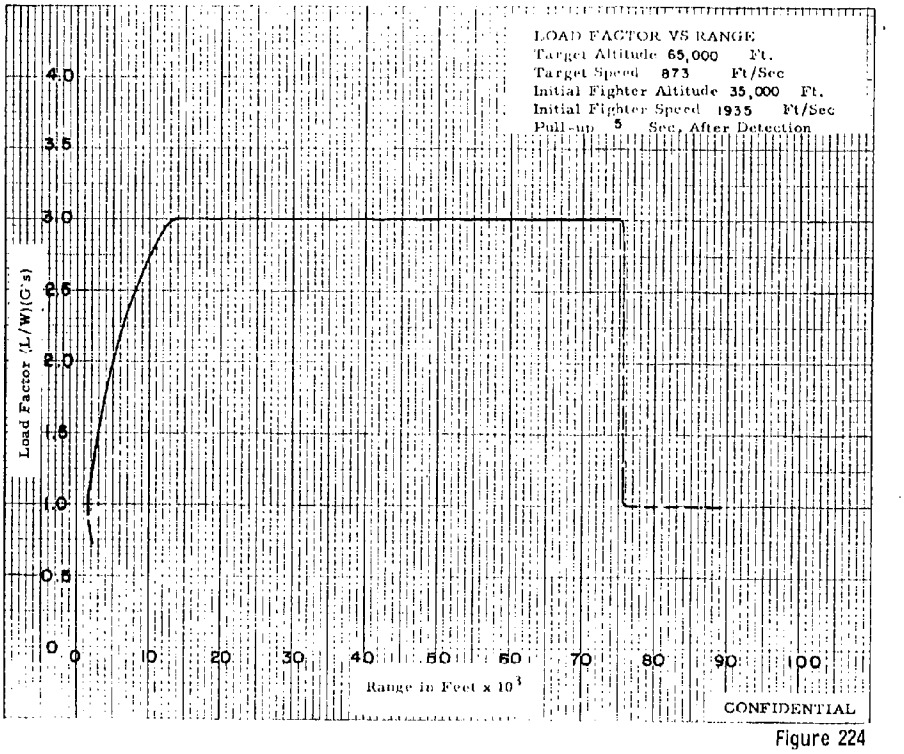
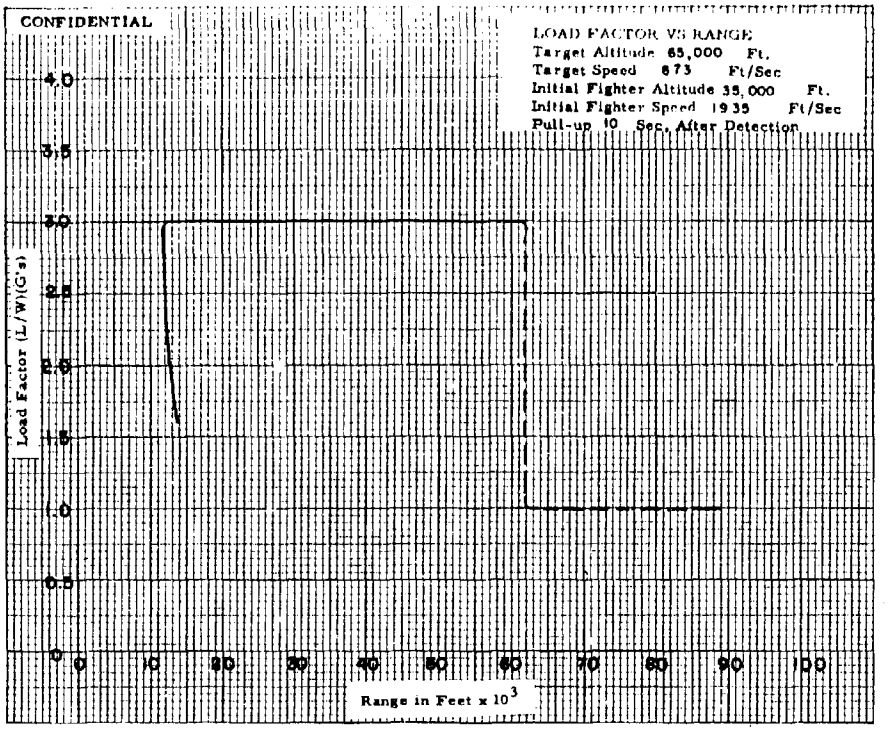

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10³
CONFIDENTIAL

Figure 224


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

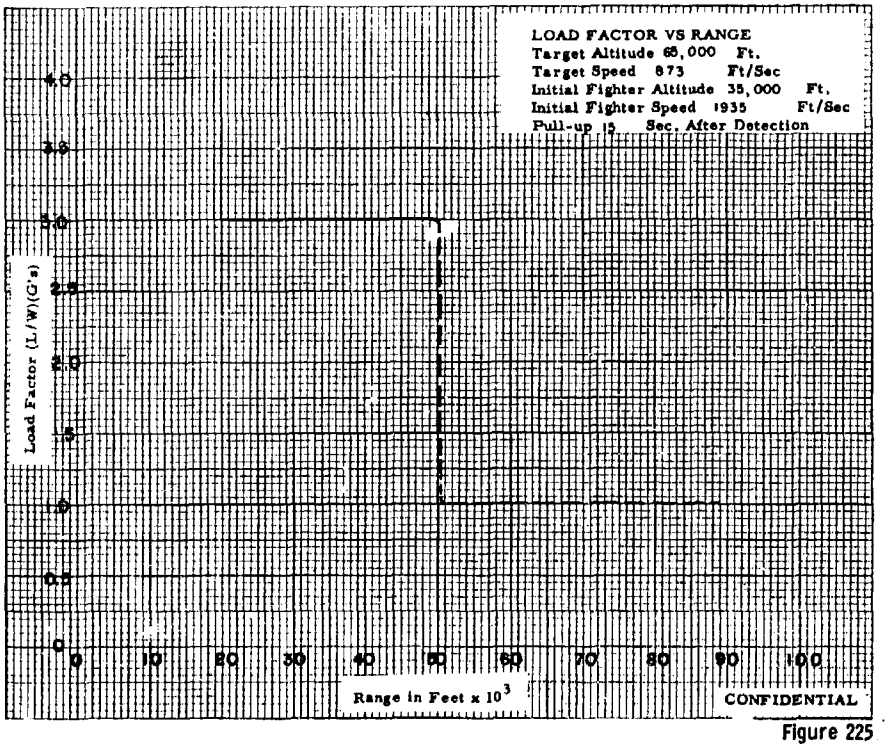

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 225

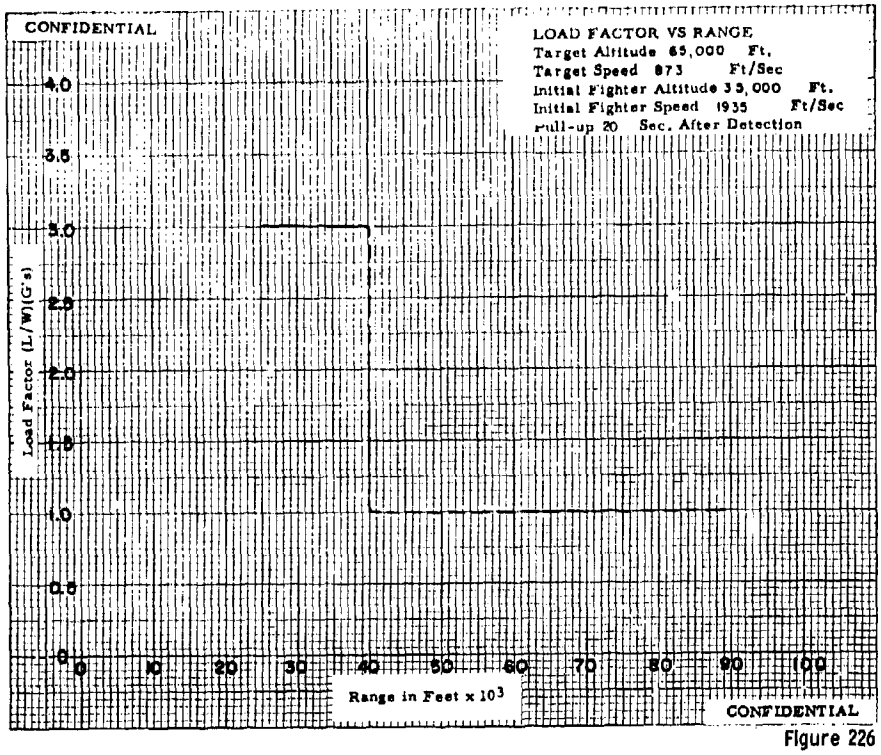


Figure 226

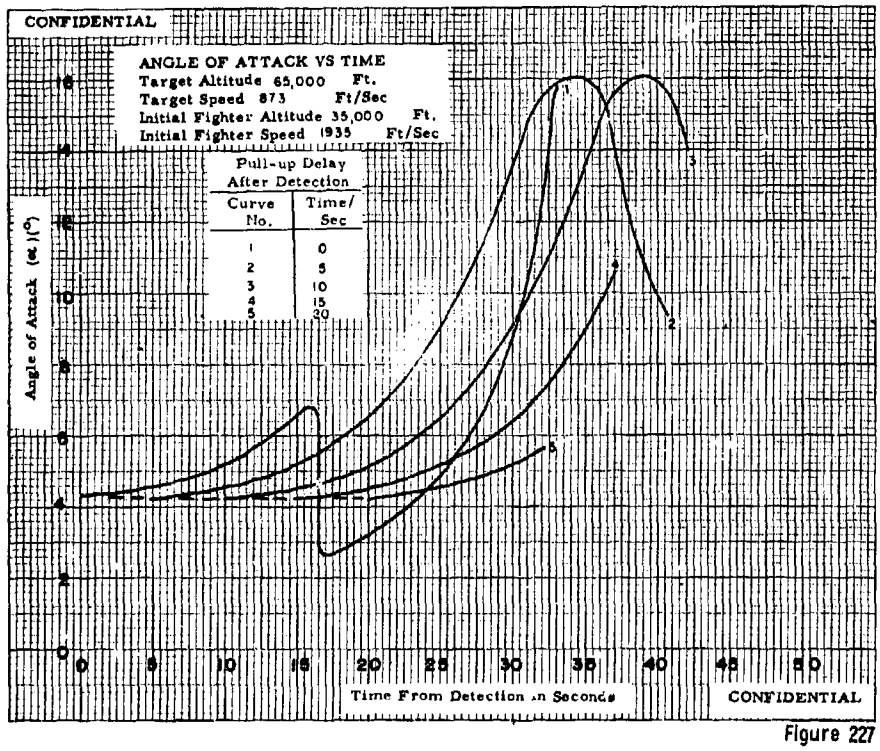


Figure 227

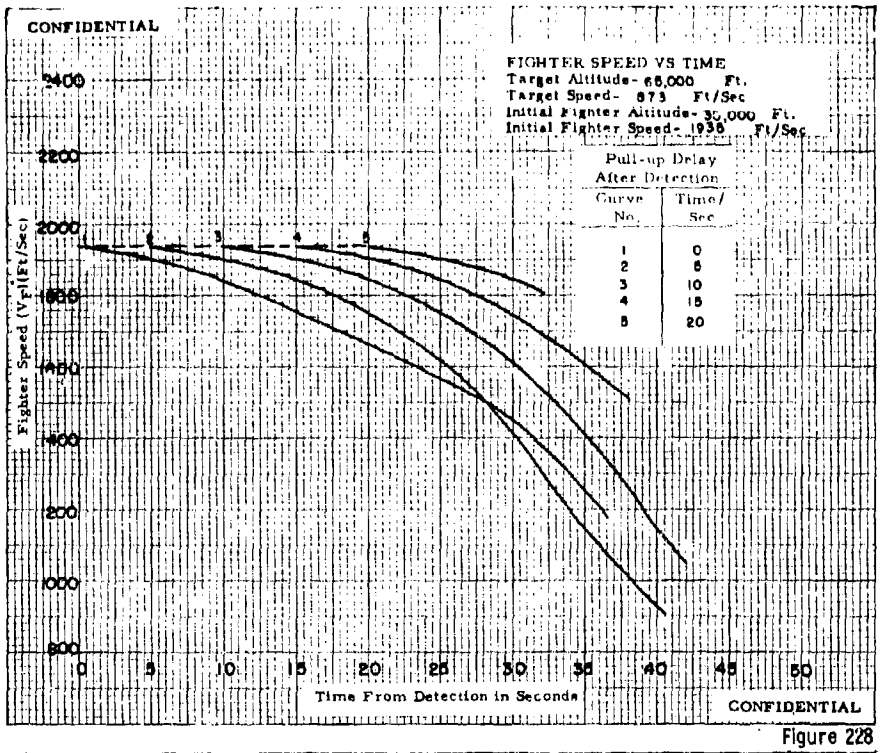


Figure 228

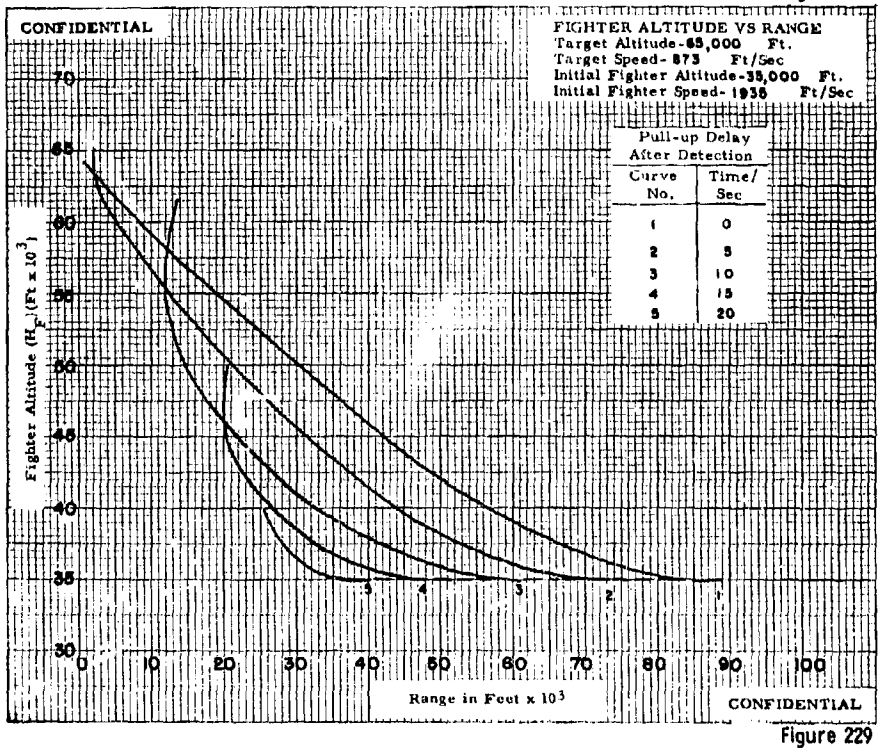
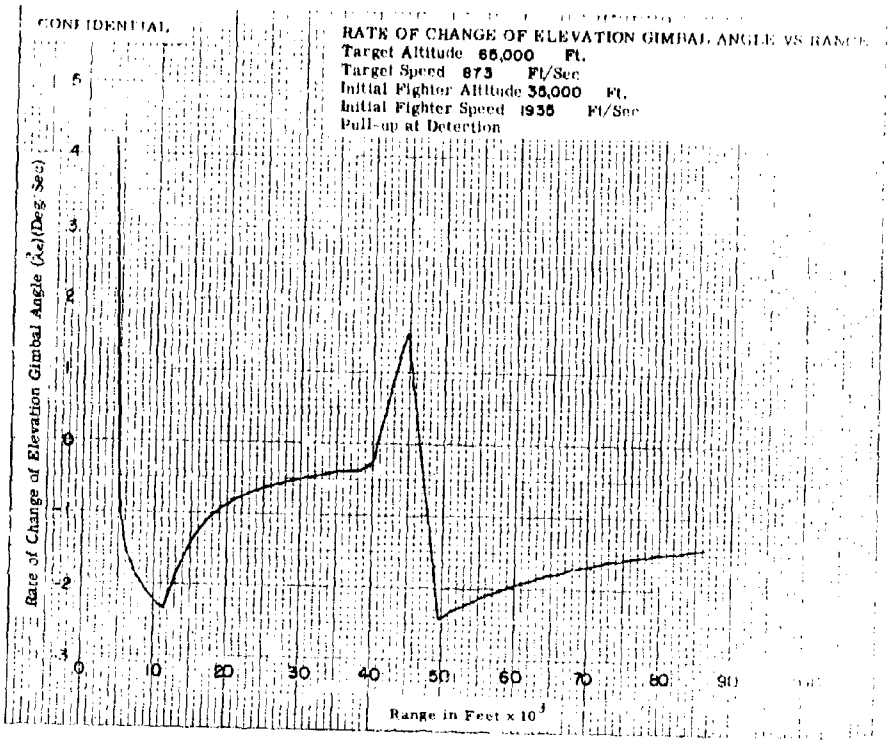


Figure 229


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle (δe)(Deg/Sec)
Range in Feet x 10³

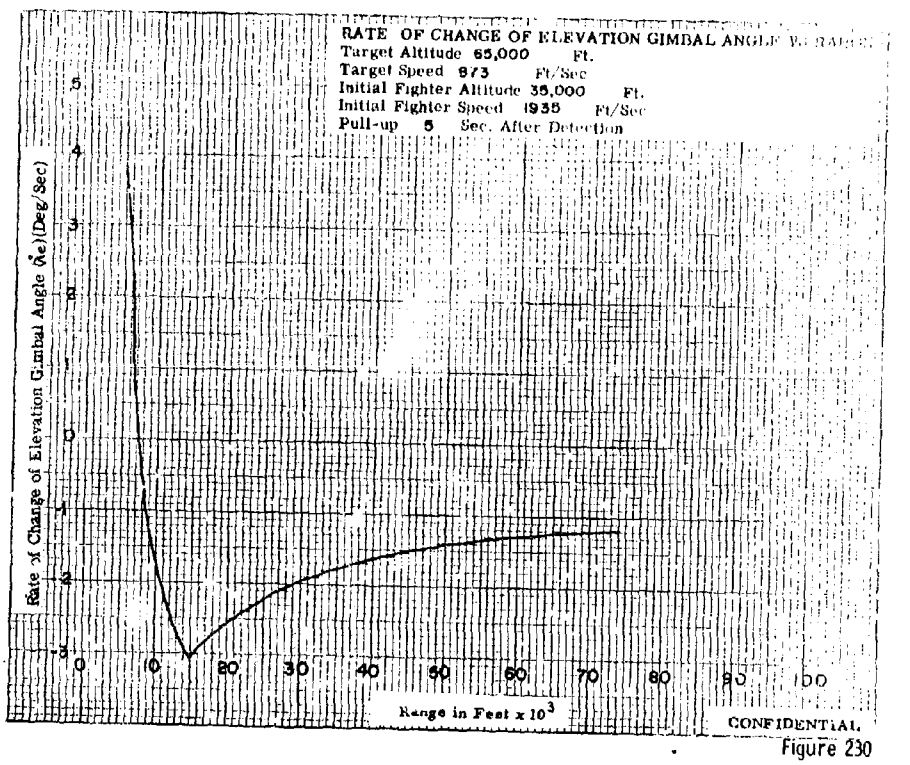
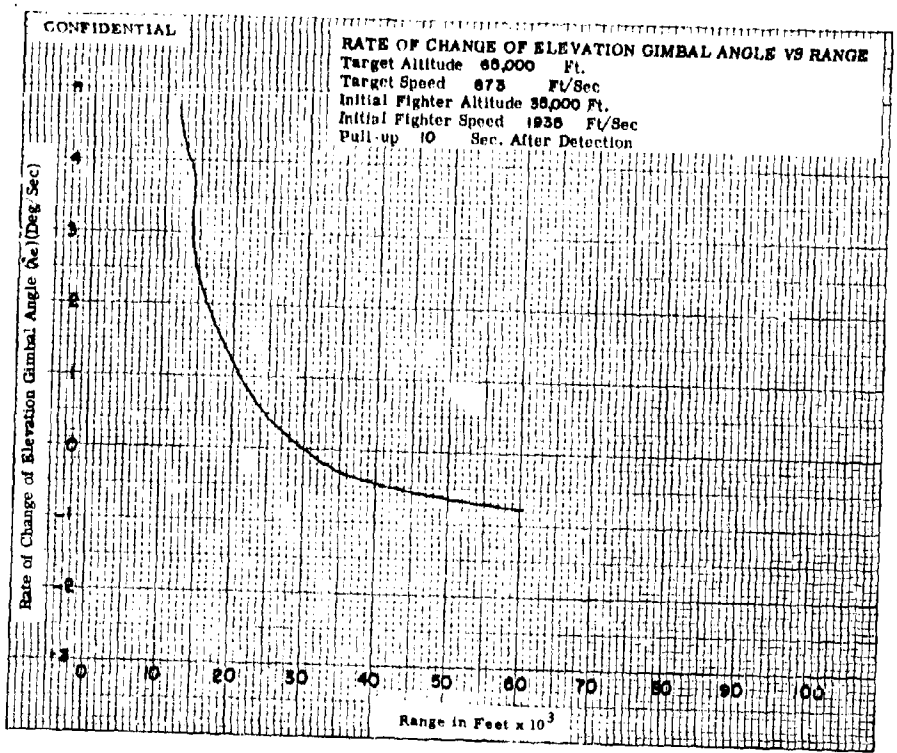

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (δe)(Deg/Sec)
Range in Feet x 10³

Figure 230


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (Ae)(Deg/Sec)
Range in Feet x 10^3

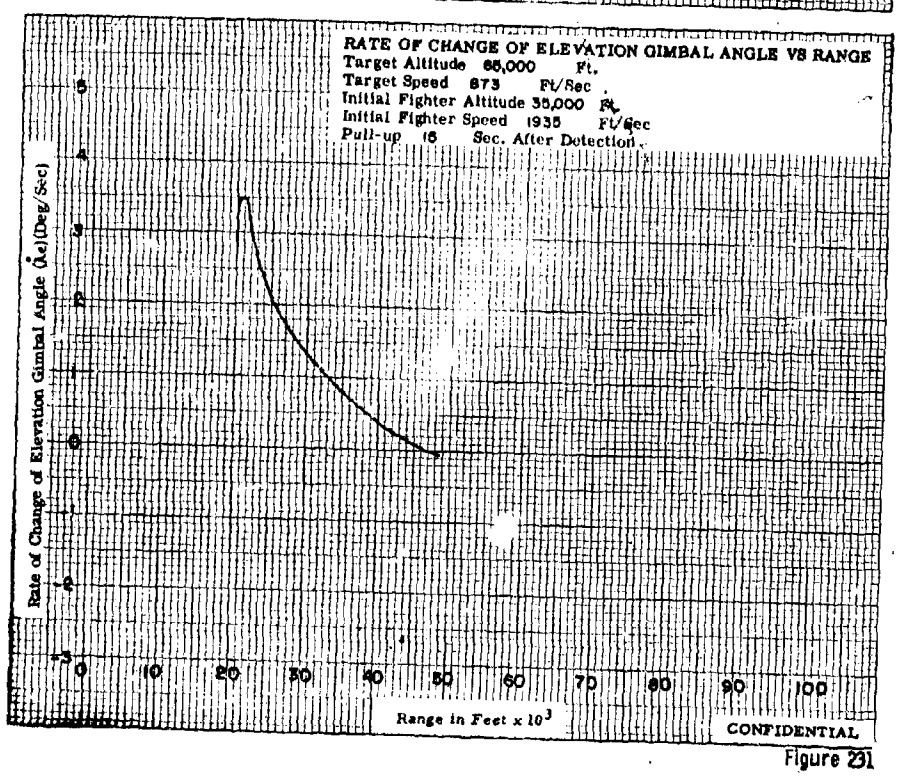

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 16 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (Ae)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 231

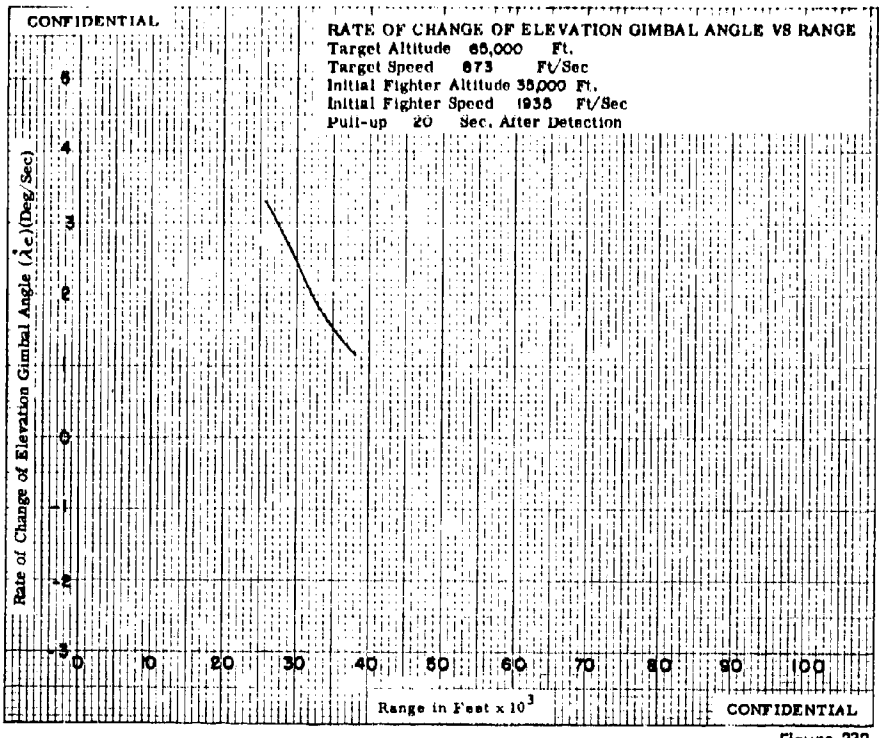


Figure 232

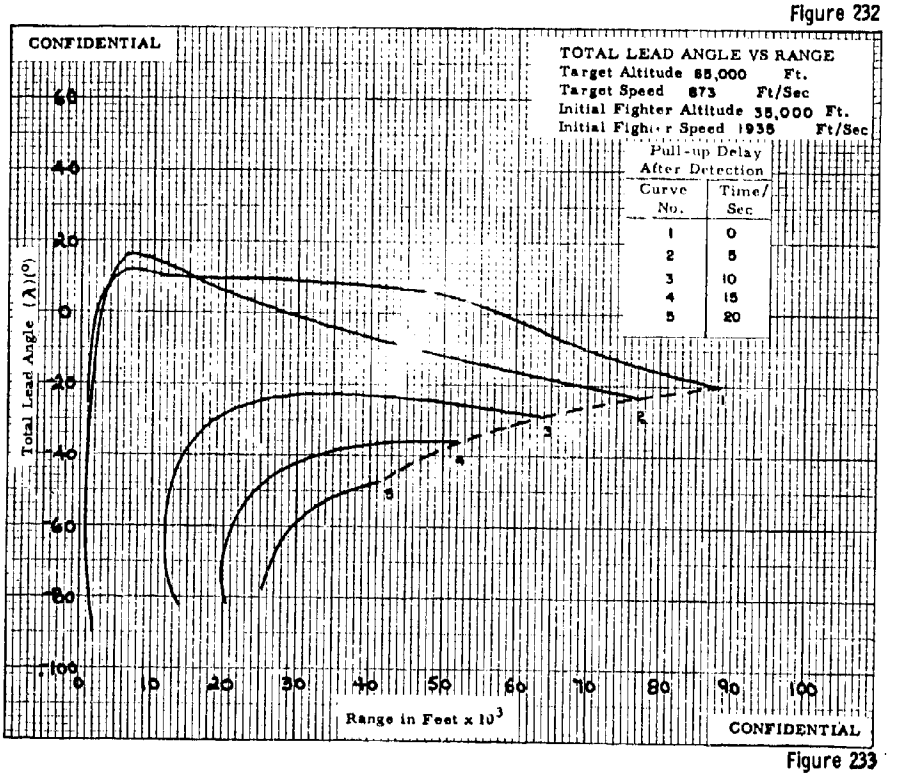
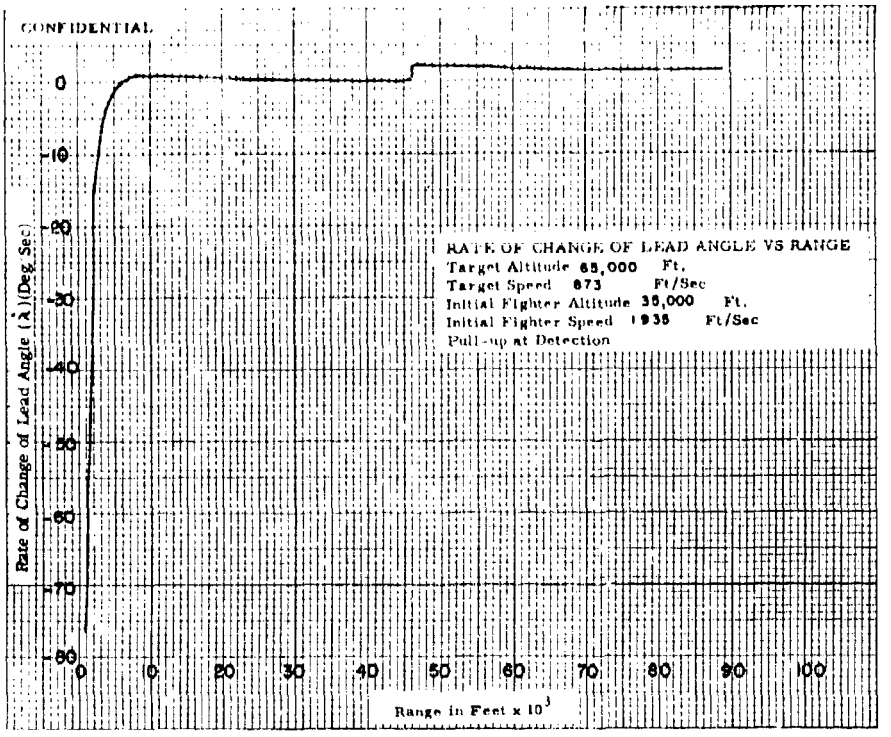


Figure 233


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-10
-20
-30
-40
-50
-60
-70
-80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

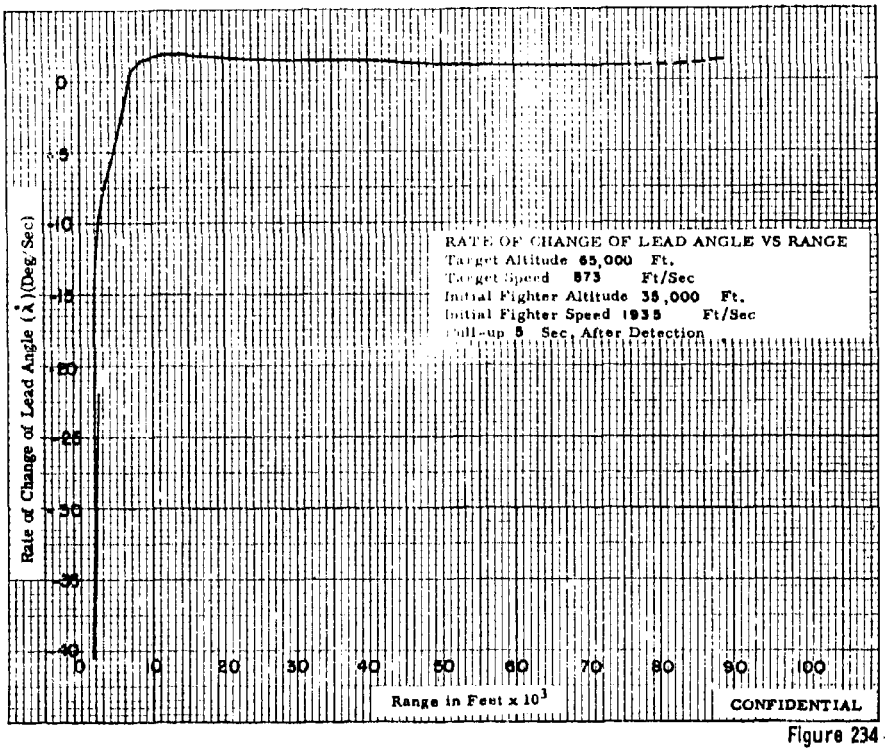
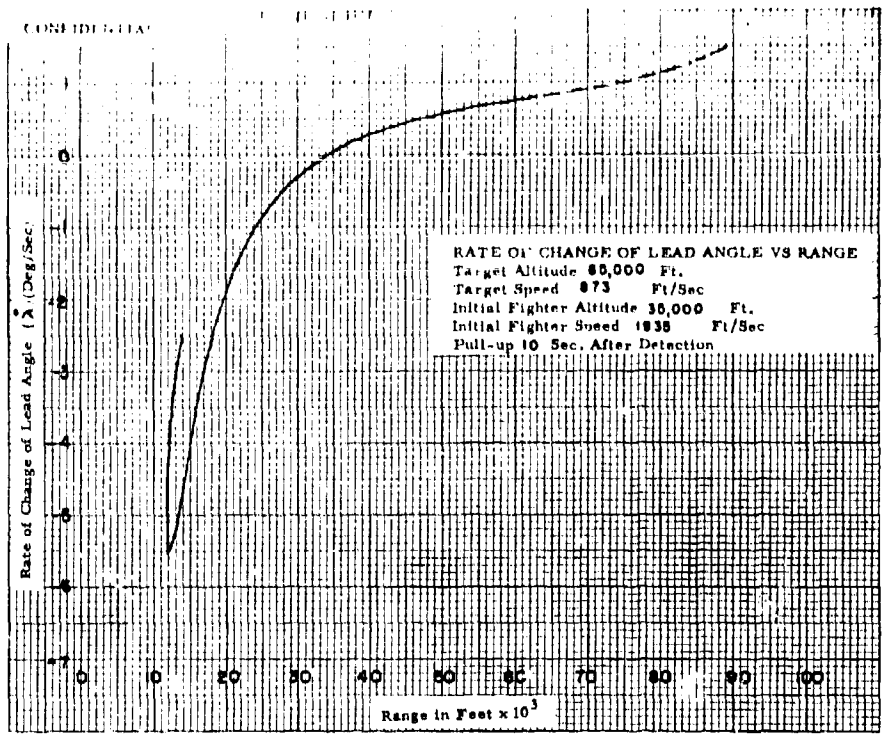

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-5
-10
-15
-20
-25
-30
-35
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 234


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
Range in Feet x 10³

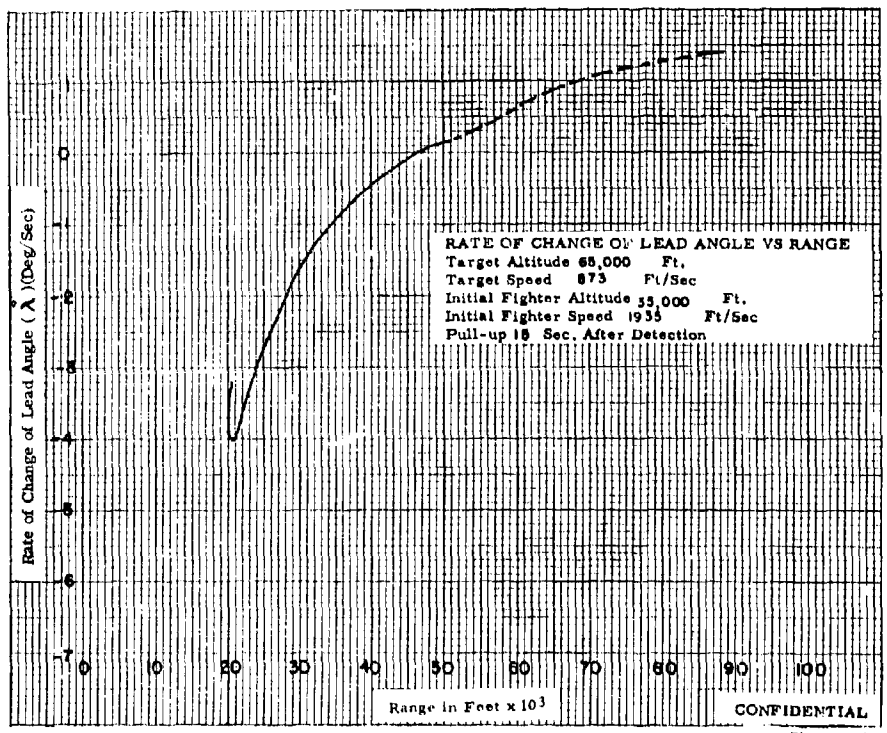

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
Range in Feet x 10³

Figure 235

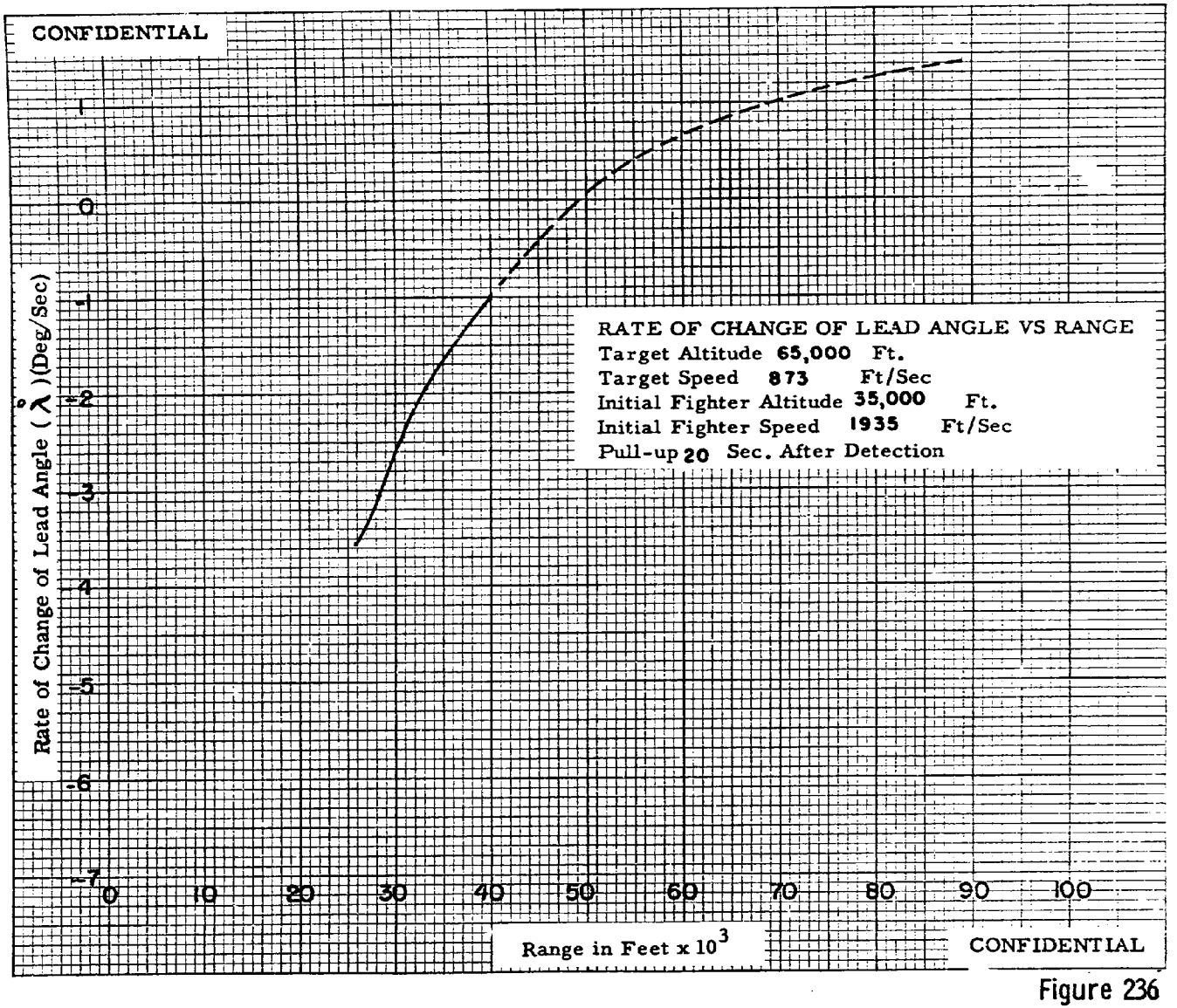
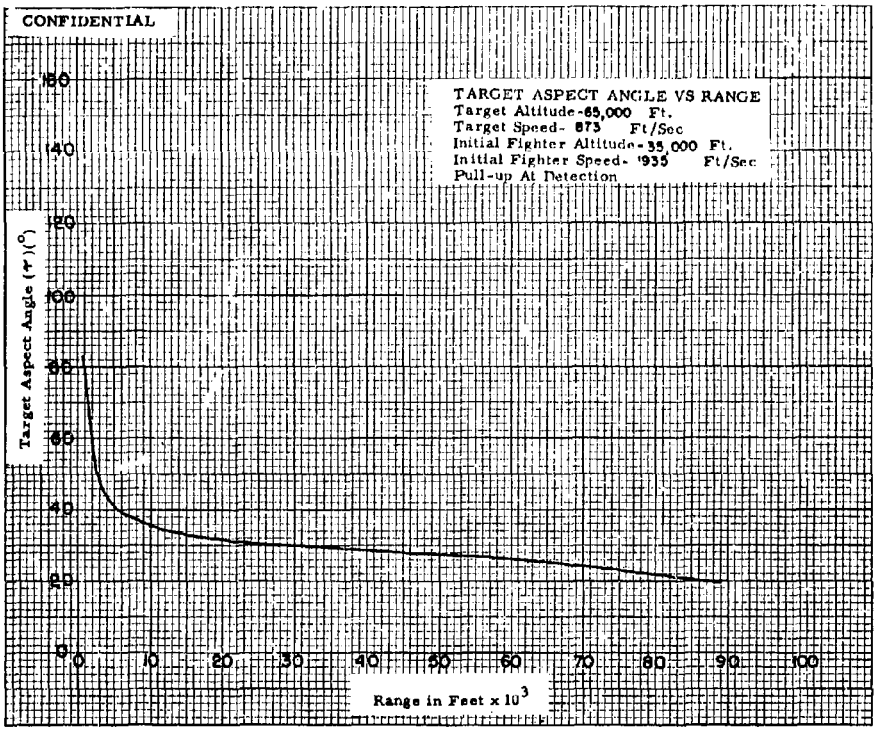

CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 20 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
1
0
-1
-2
-3
-4
-5
-6
-7
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 236


TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-35,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up At Detection
Target Aspect Angle (ψ)(°)
180
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

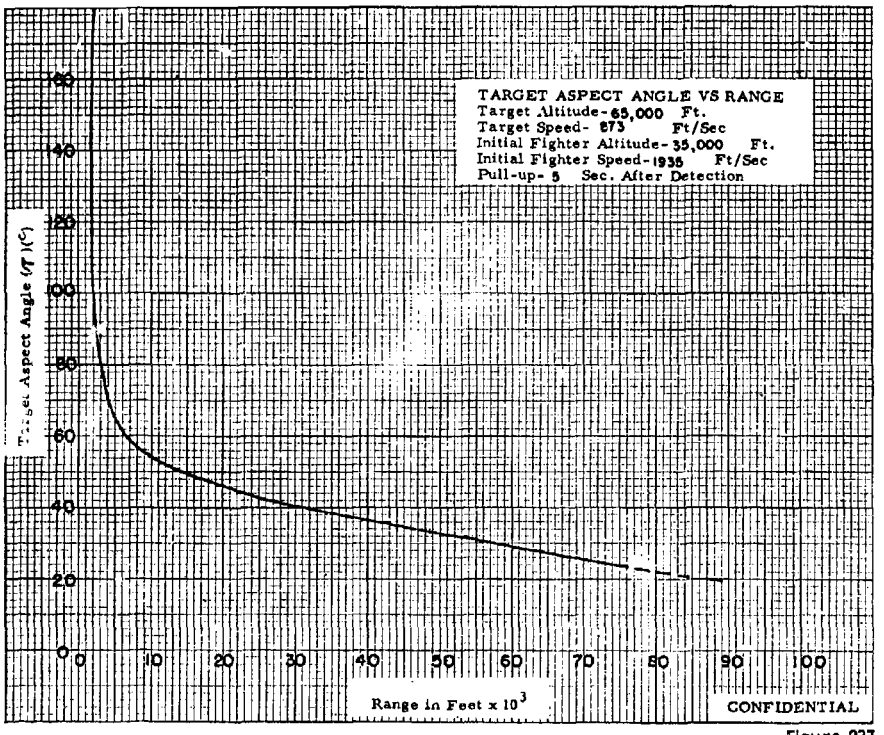
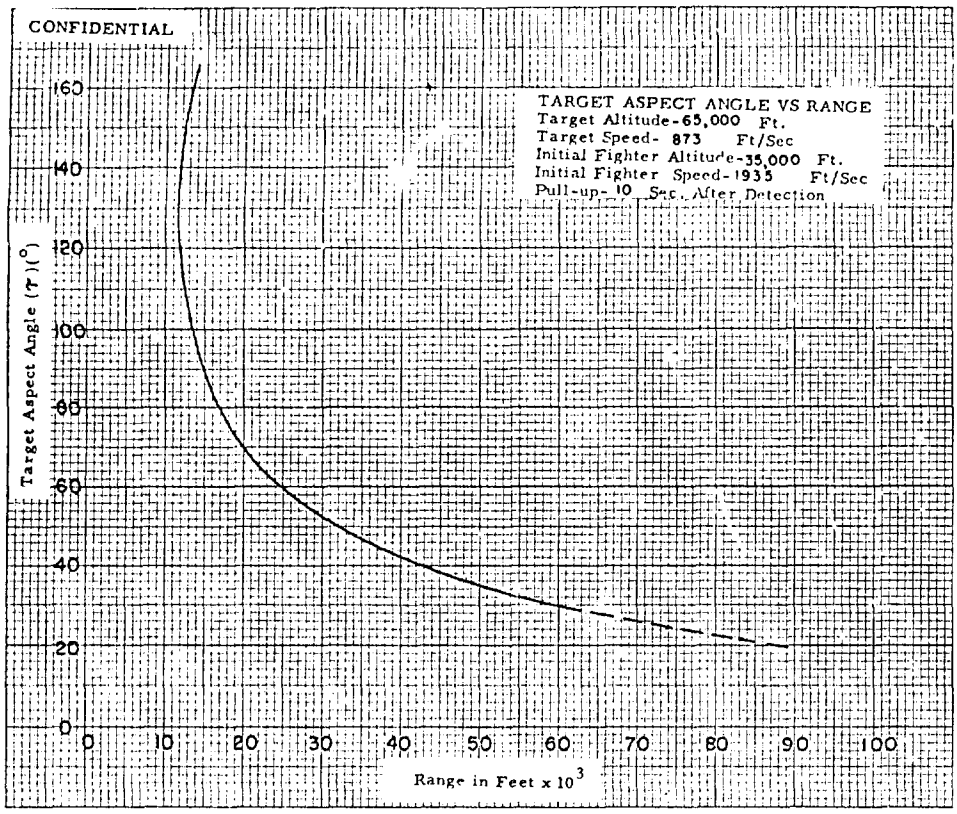
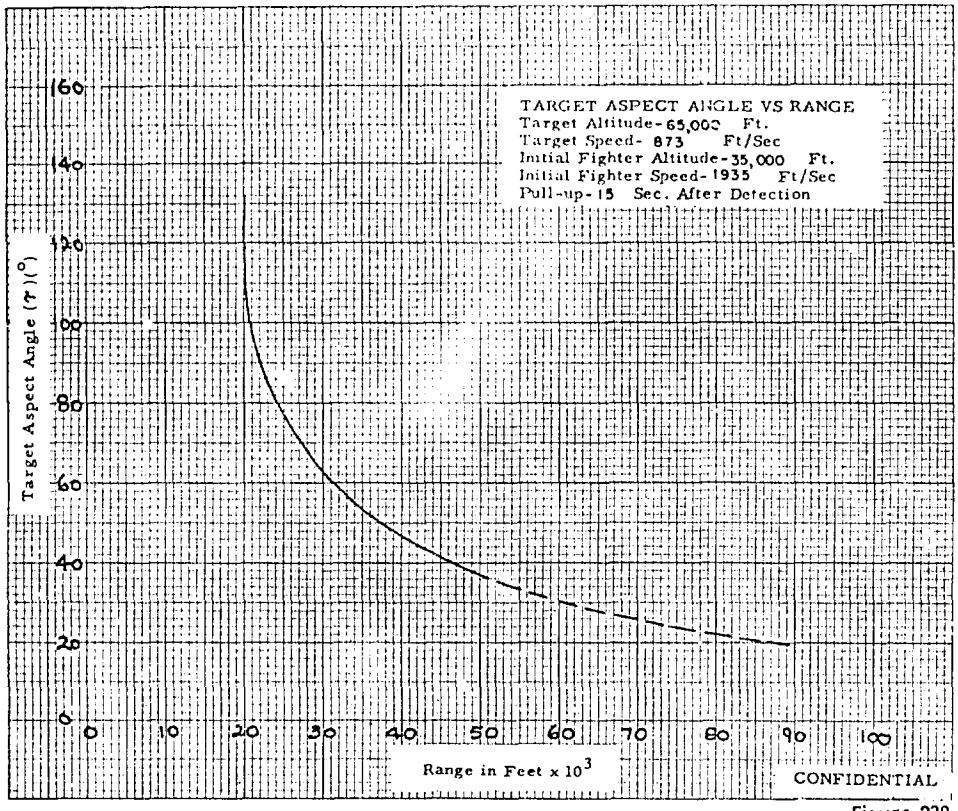

TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-35,000 Ft.
Initial Fighter Speed-1935 Ft/Sec
Pull-up- 5 Sec. After Detection
Target Aspect Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 237

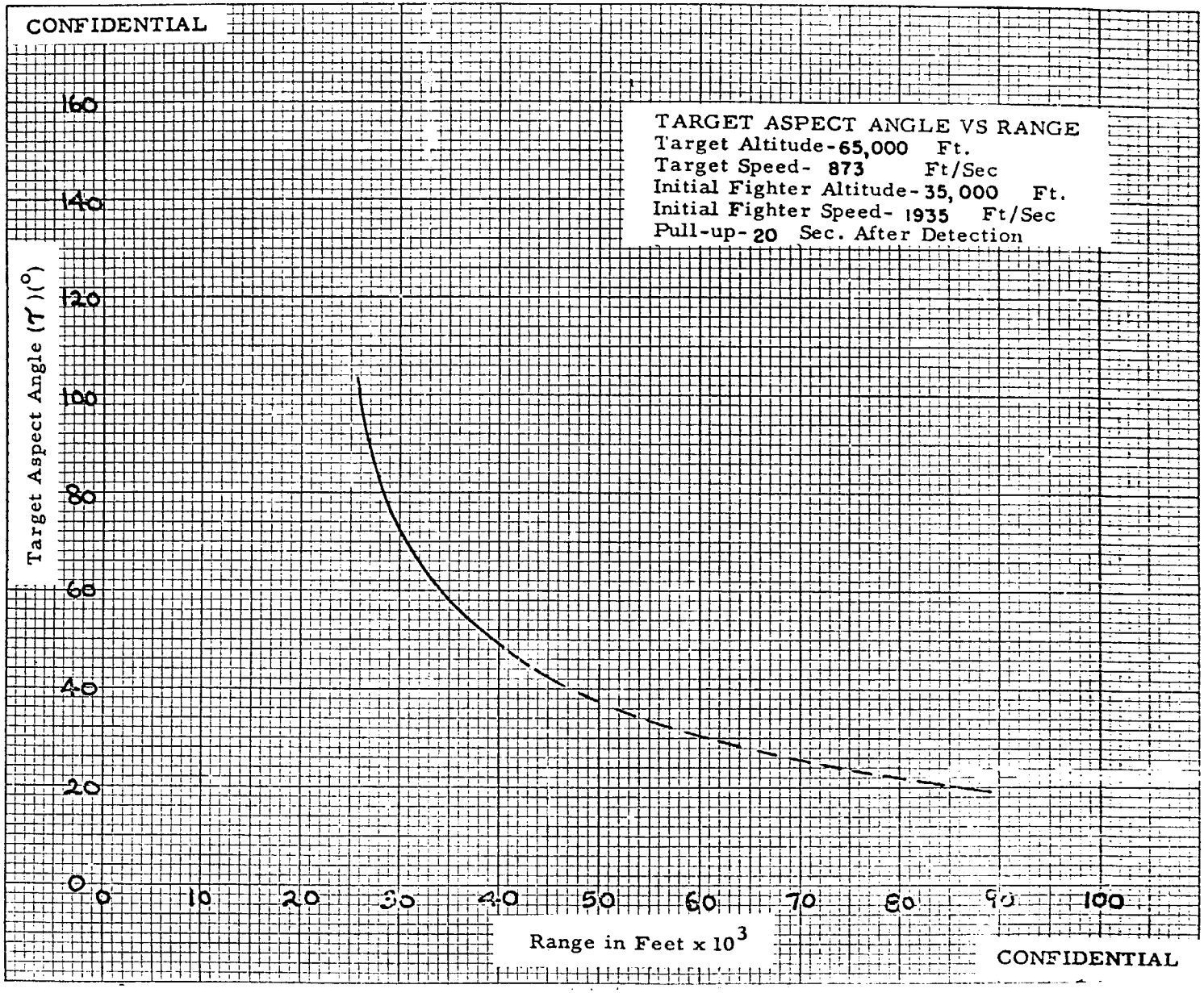
CONFIDENTIAL

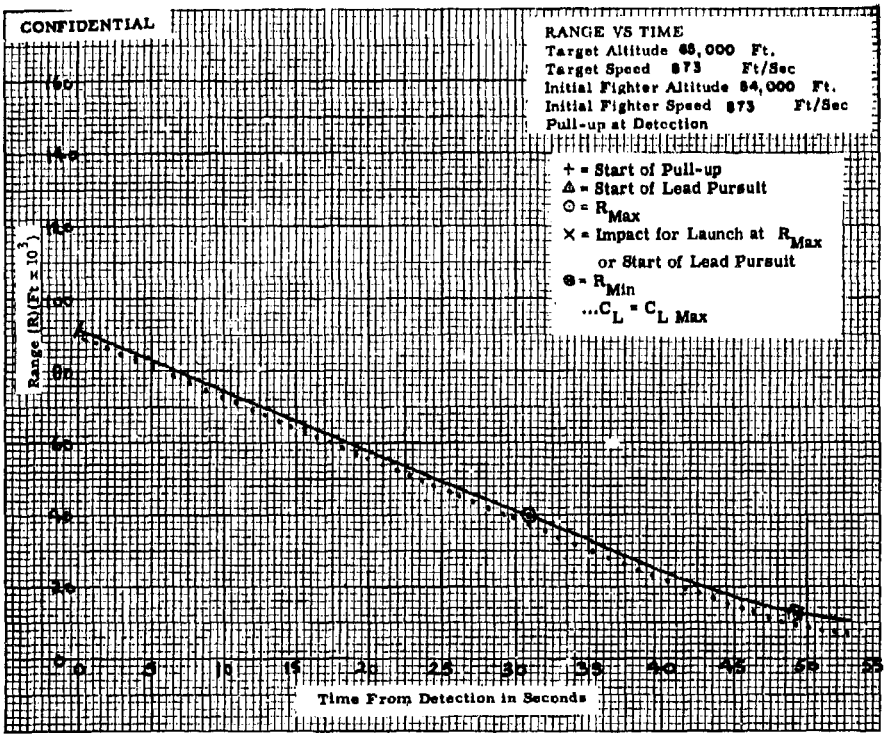




CONFIDENTIAL

Figure 238


TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-35,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up- 20 Sec. After Detection
Target Aspect Angle (γ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊛ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

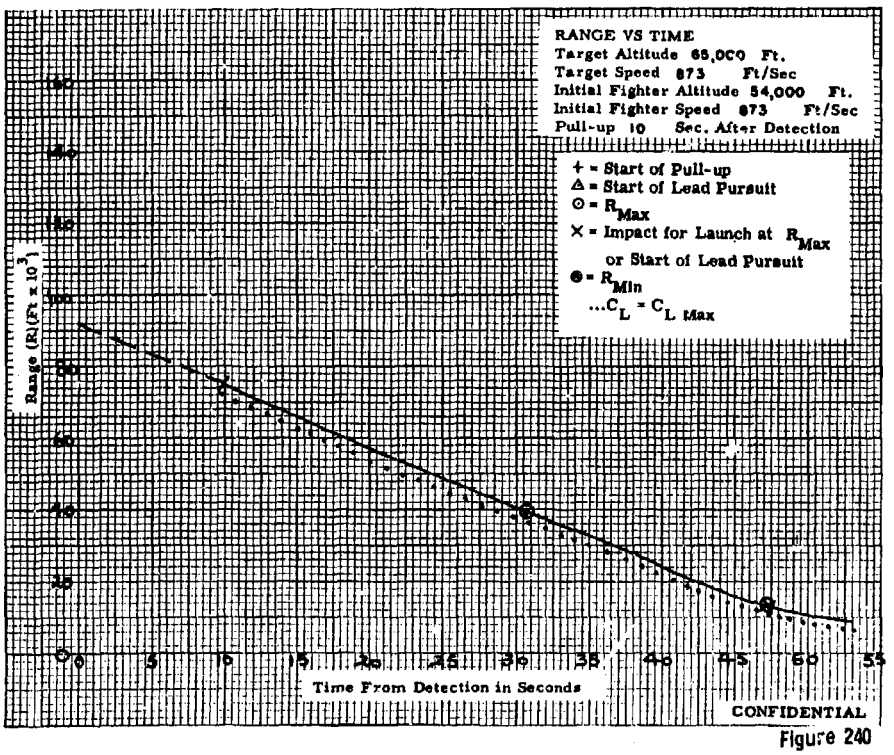
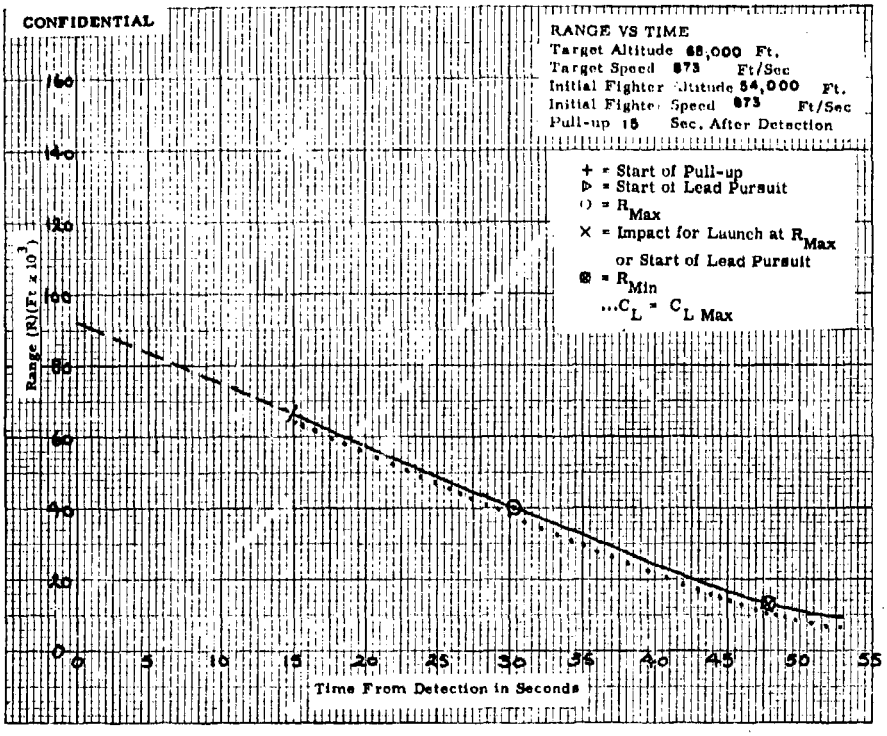

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊛ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 240


RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min
...C L = C L Max
Range (R)(Ft x 10³)
Time From Detection in Seconds

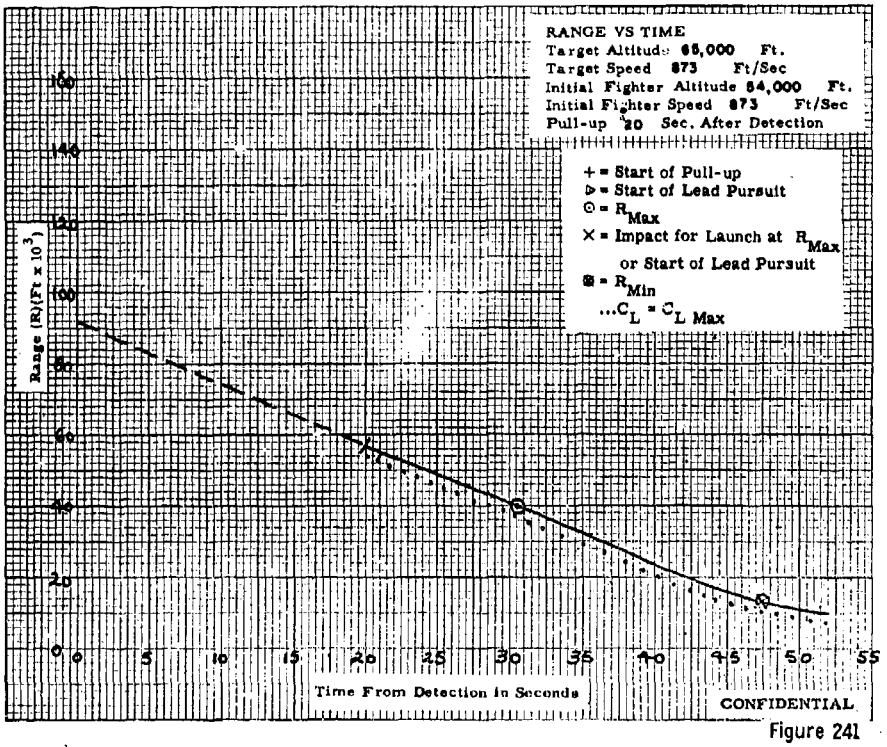
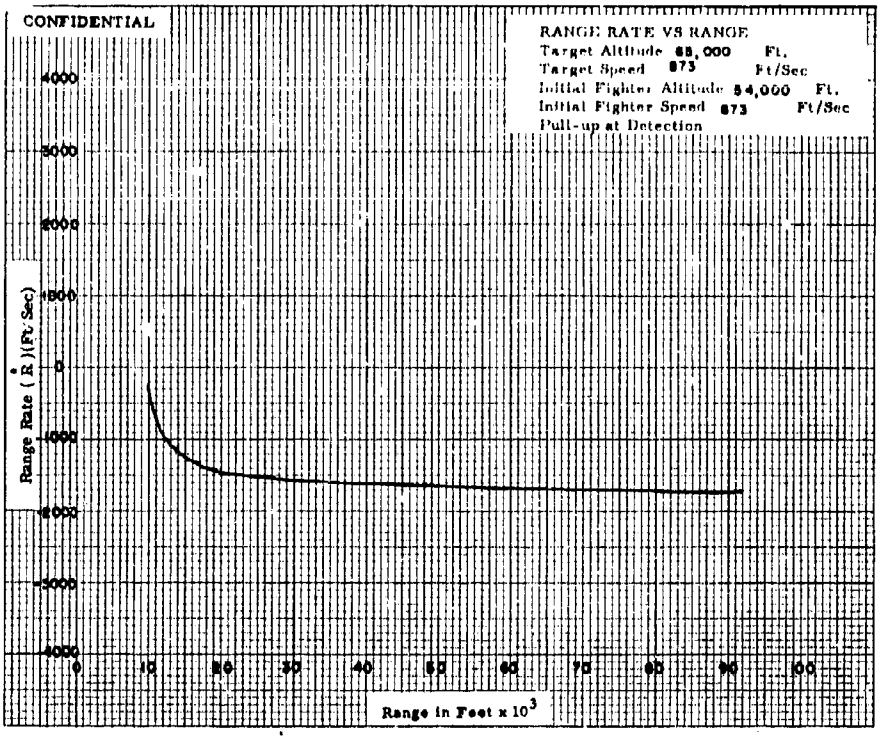

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min
...C L = C L Max
Range (R)(Ft x 10³)
Time From Detection in Seconds

Figure 241


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ)(Ft/Sec)
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

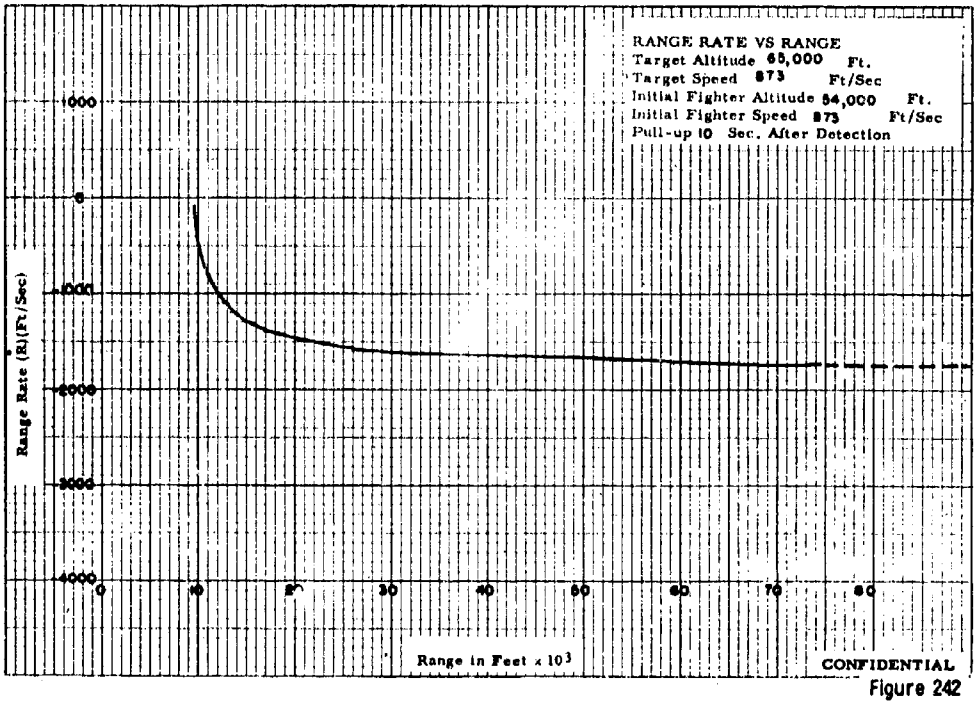
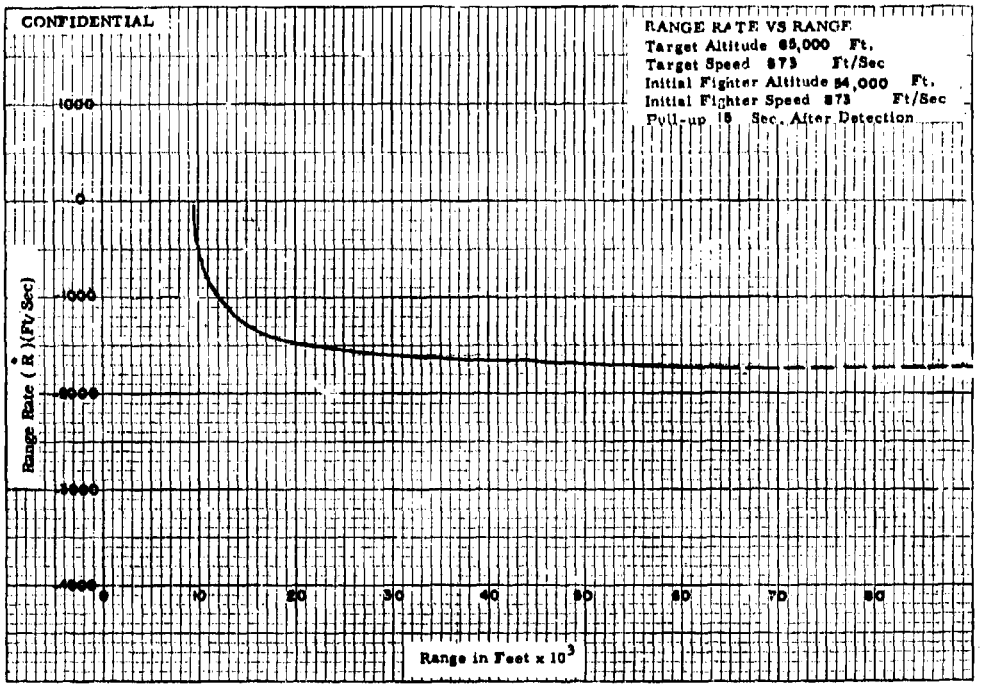

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 242


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
1000
0
-1000
-2000
-3000
-4000
Range Rate (Ṙ)(Ft/Sec)
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

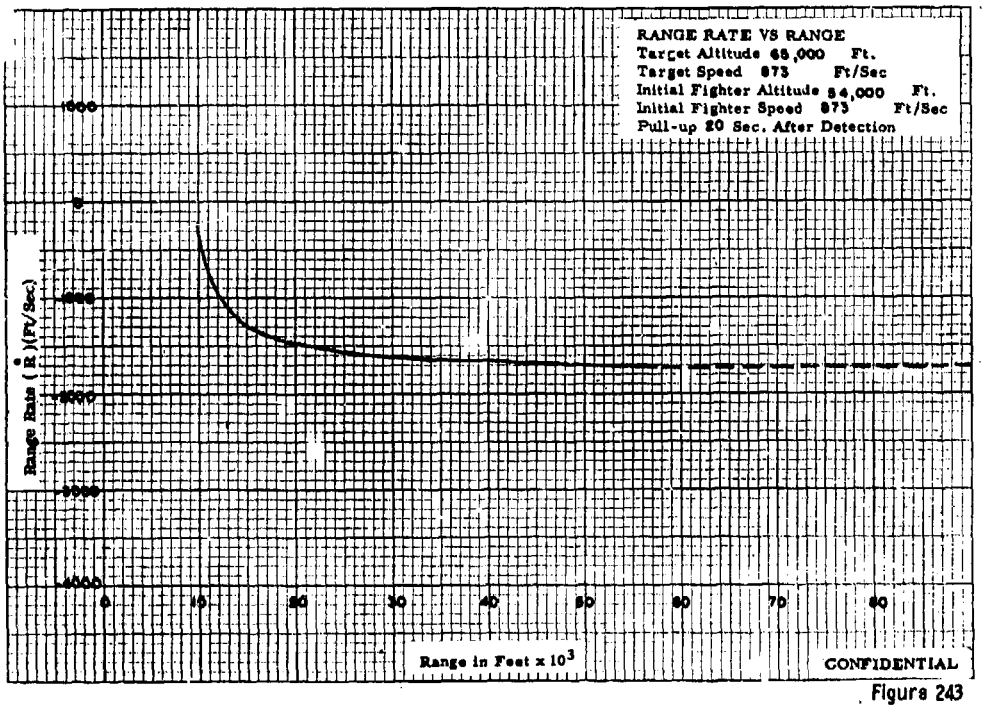
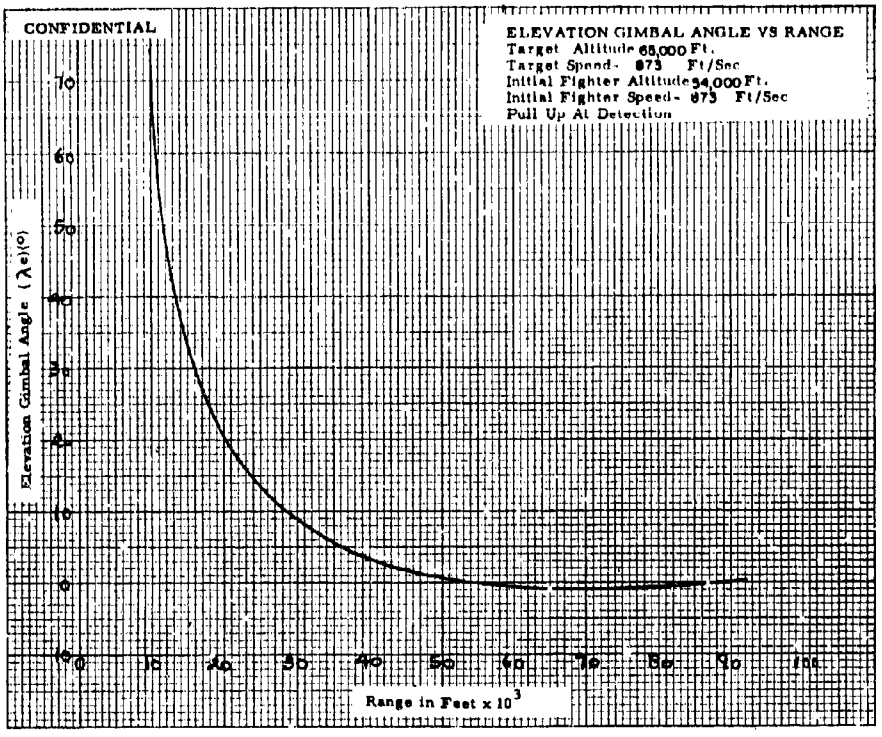

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
1000
0
-1000
-2000
-3000
-4000
Range Rate (Ṙ)(Ft/Sec)
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 243


CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude 34,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull Up At Detection
Elevation Gimbal Angle (λel)(°)
Range in Feet x 10^3

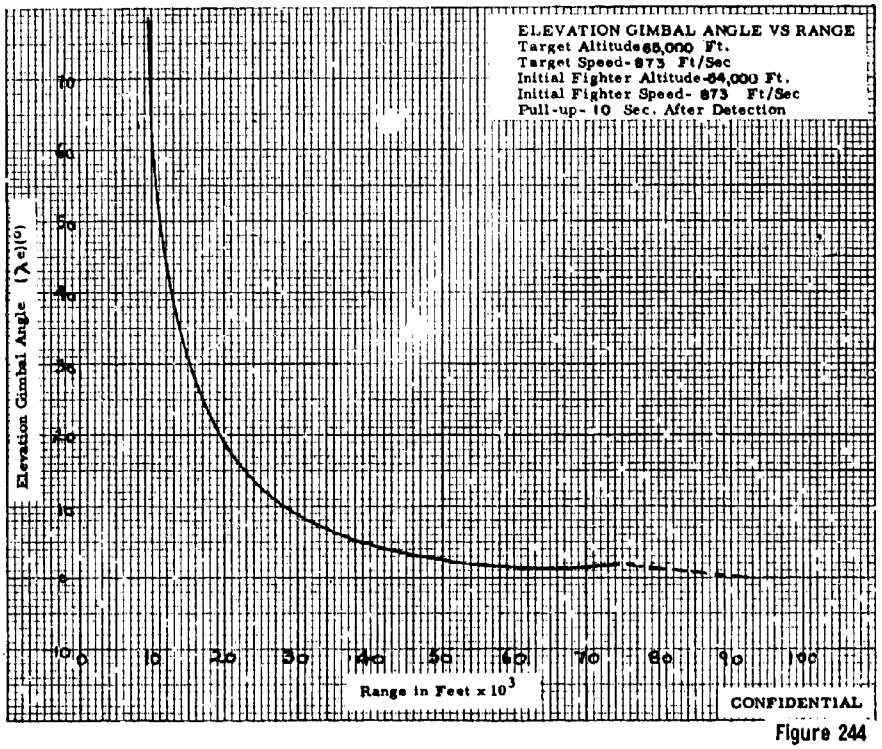
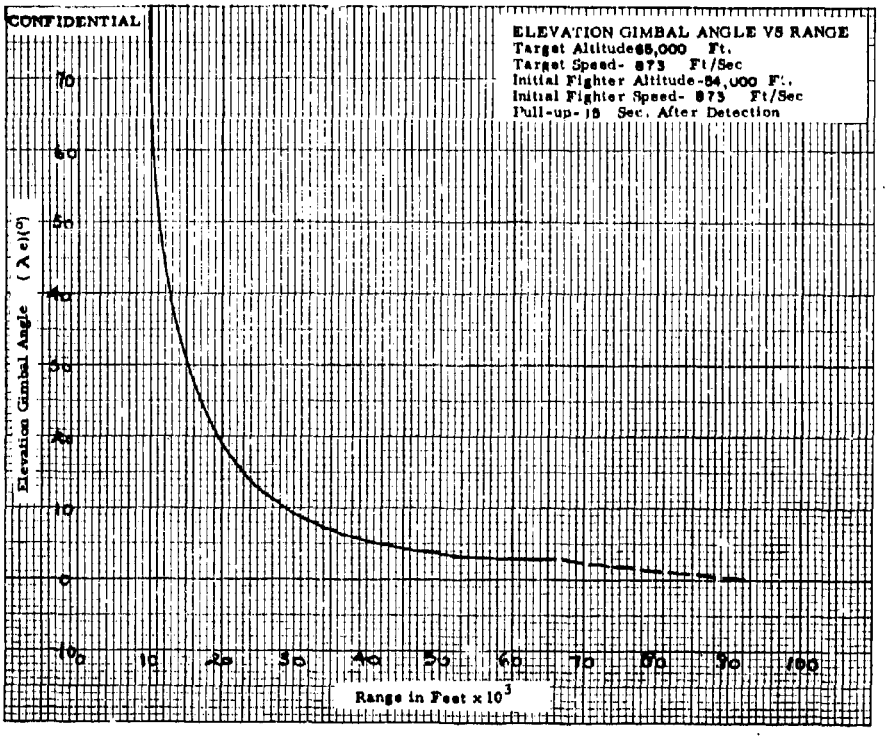

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 64,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 10 Sec. After Detection
Elevation Gimbal Angle (λel)(°)
Range in Feet x 10^3
CONFIDENTIAL

Figure 244


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-64,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 15 Sec. After Detection
Elevation Gimbal Angle (λe)(°)
70
60
50
40
30
20
10
0
-10
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

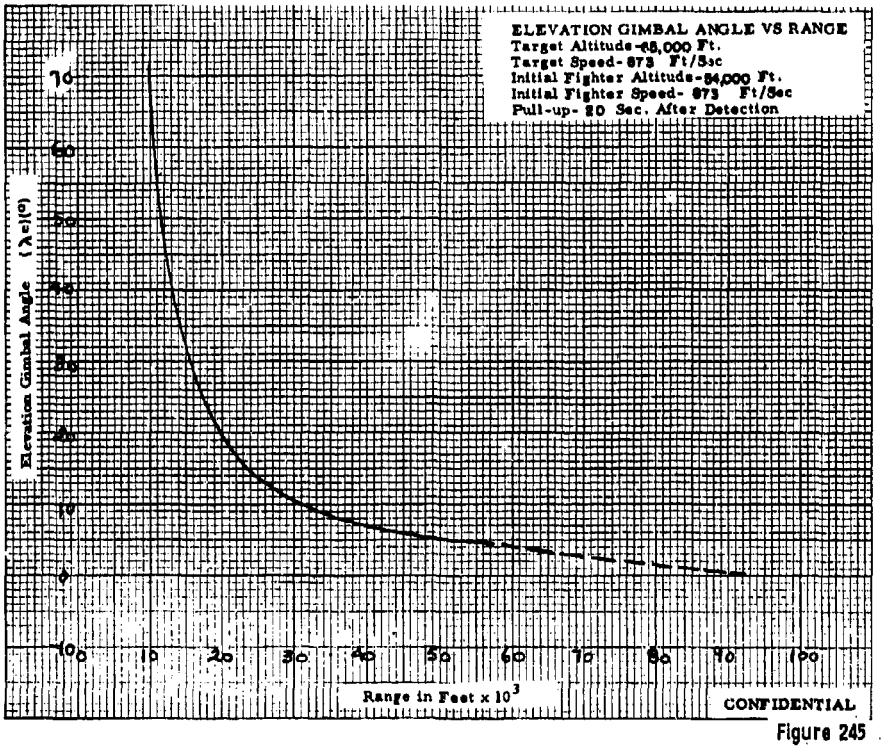
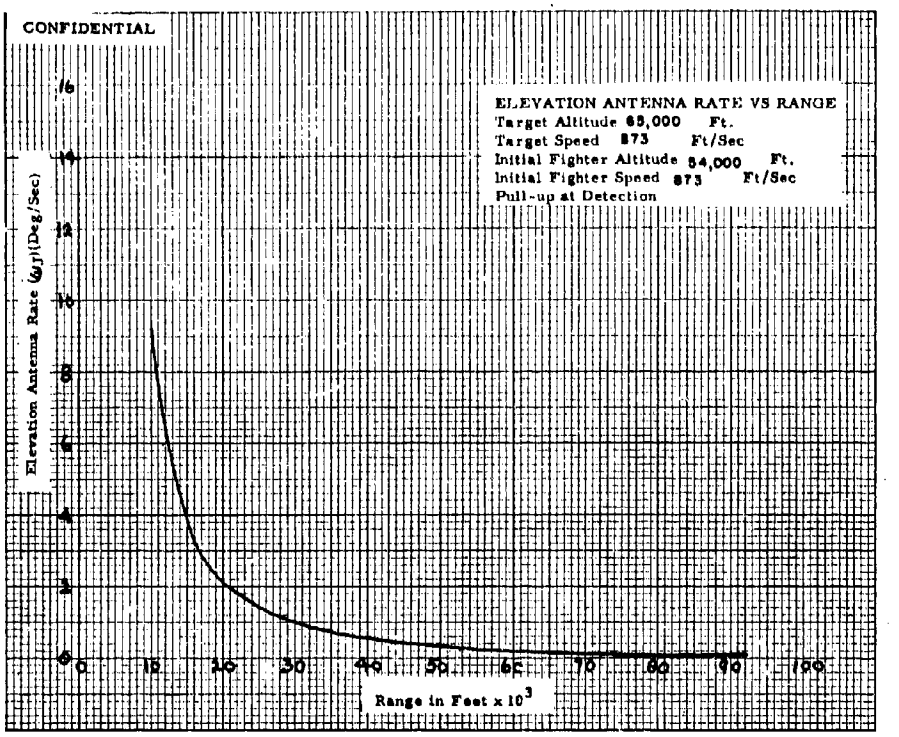

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-64,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 20 Sec. After Detection
Elevation Gimbal Angle (λe)(°)
70
60
50
40
30
20
10
0
-10
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 245


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Elevation Antenna Rate (ω)(Deg/Sec)
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

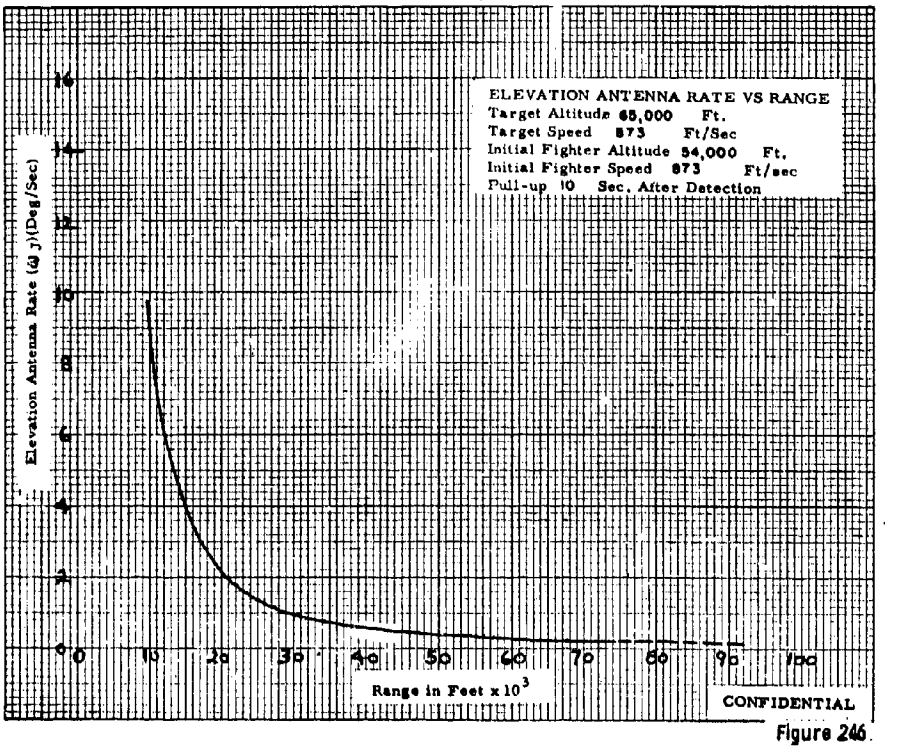
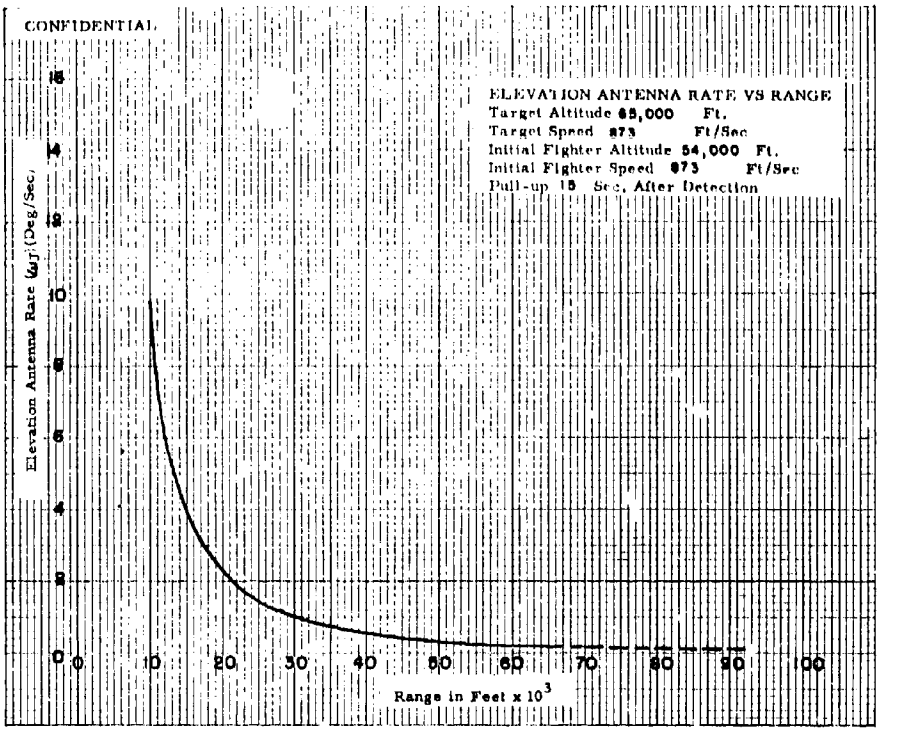

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/sec
Pull-up 10 Sec. After Detection
Elevation Antenna Rate (ω)(Deg/Sec)
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 246.


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Elevation Antenna Rate (ω_J) (Deg/Sec)
Range in Feet x 10^3

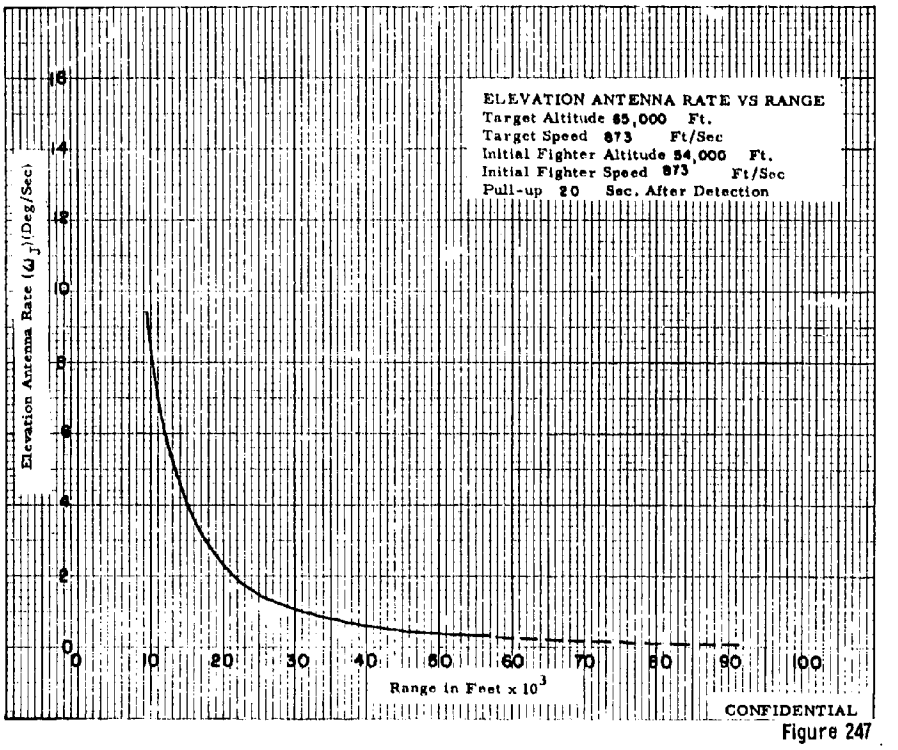

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Elevation Antenna Rate (ω_J) (Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 247

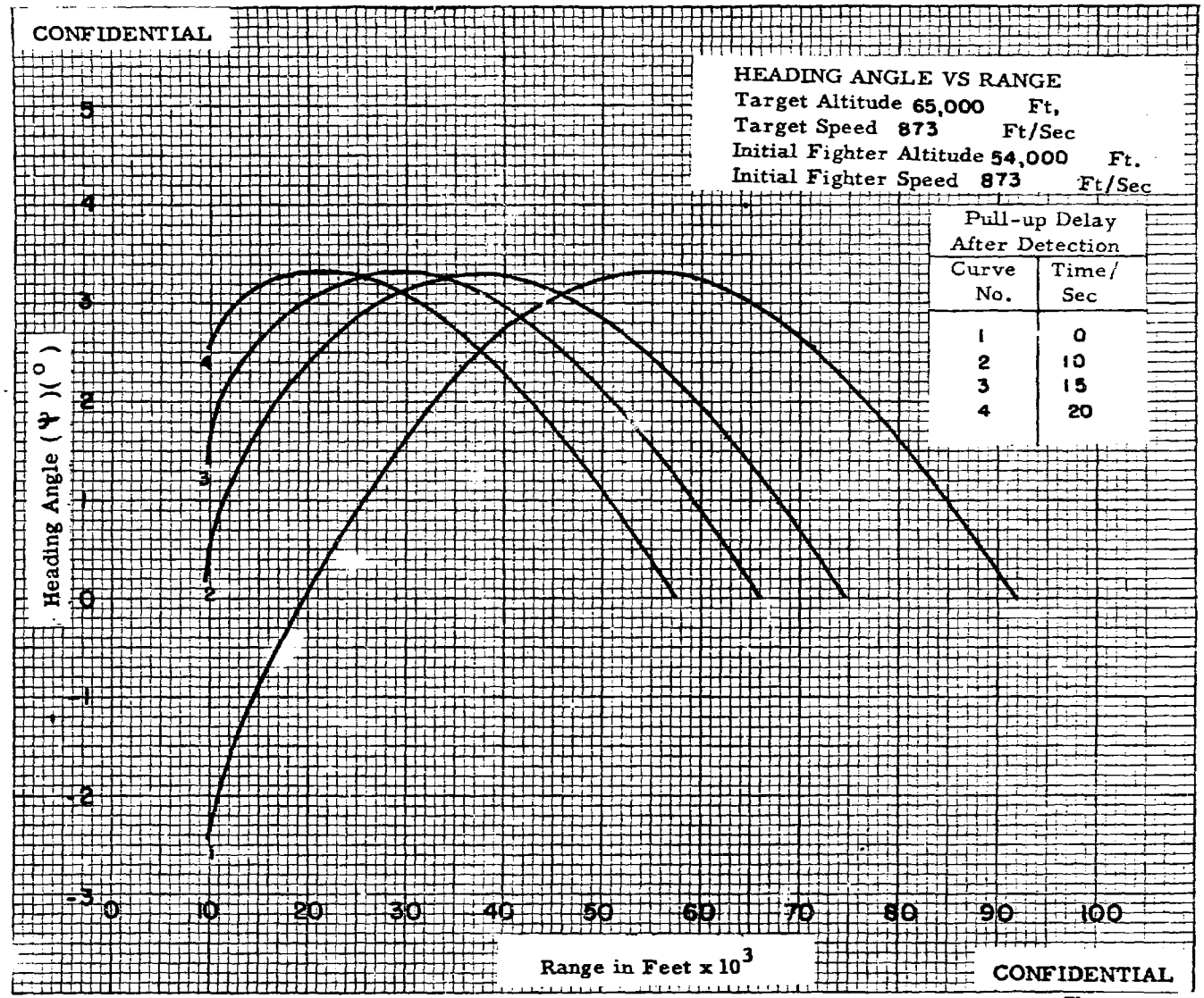
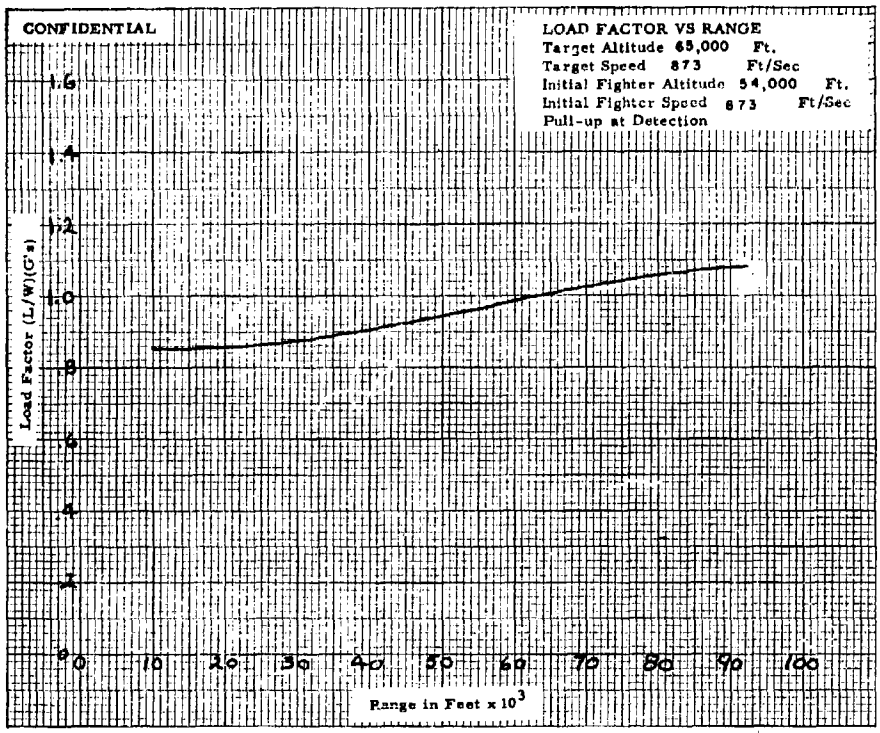

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft,
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 15
4 | 20
Heading Angle (Ψ)(°)
5
4
3
2
1
0
-1
-2
-3
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 248


LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
1.6
1.4
1.2
1.0
.8
.6
.4
.2
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

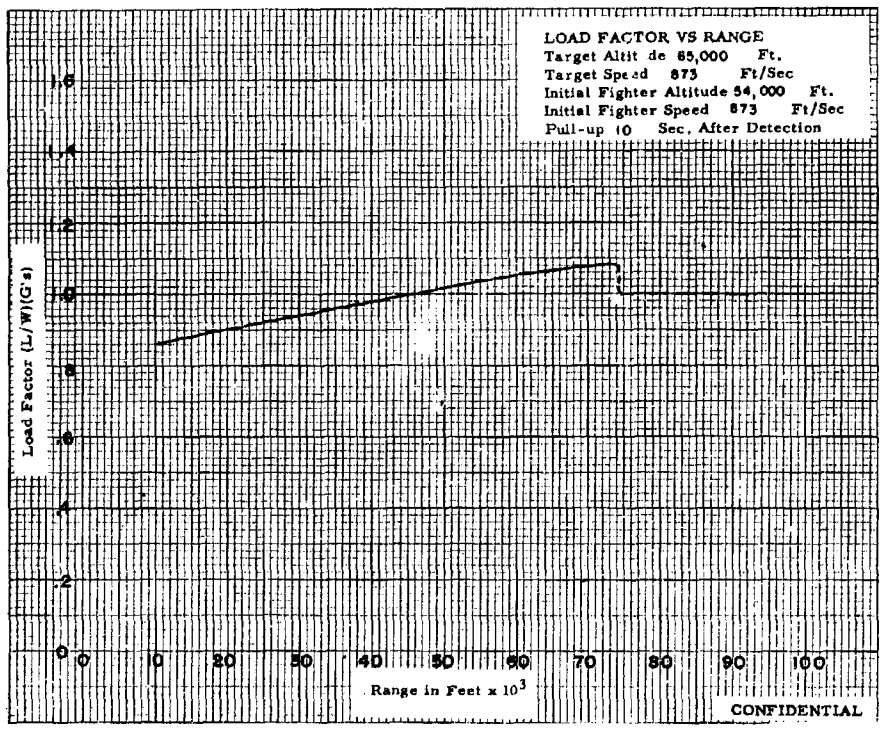
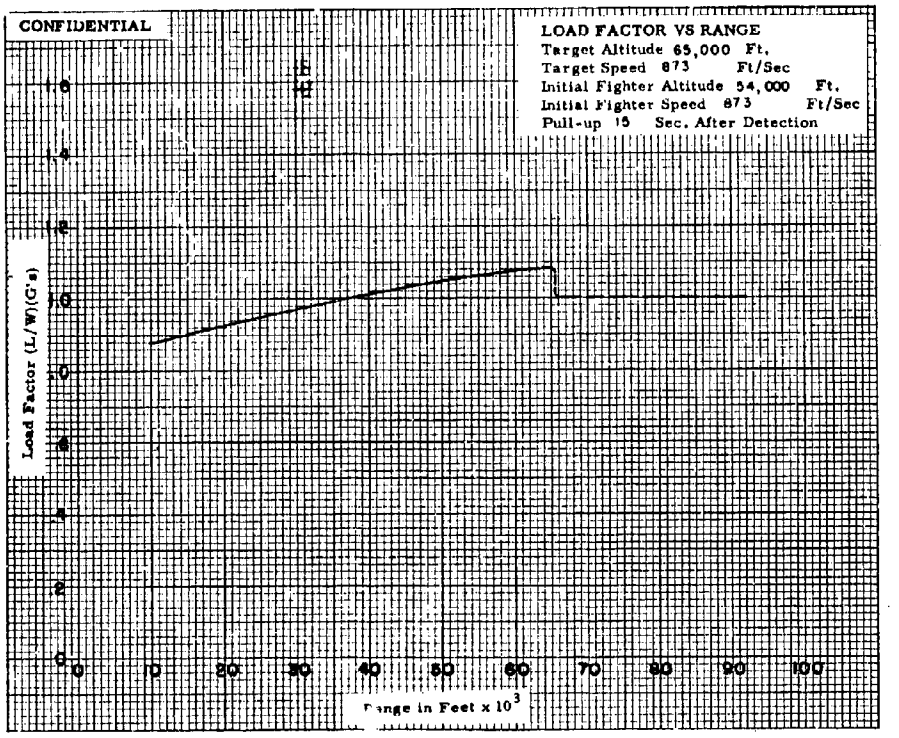

LOAD FACTOR VS RANGE
Target Altit de 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
1.6
1.4
1.2
1.0
.8
.6
.4
.2
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

Figure 249


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Load Factor (L/W)(G's)
1.6
1.4
1.2
1.0
.8
.6
.4
.2
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

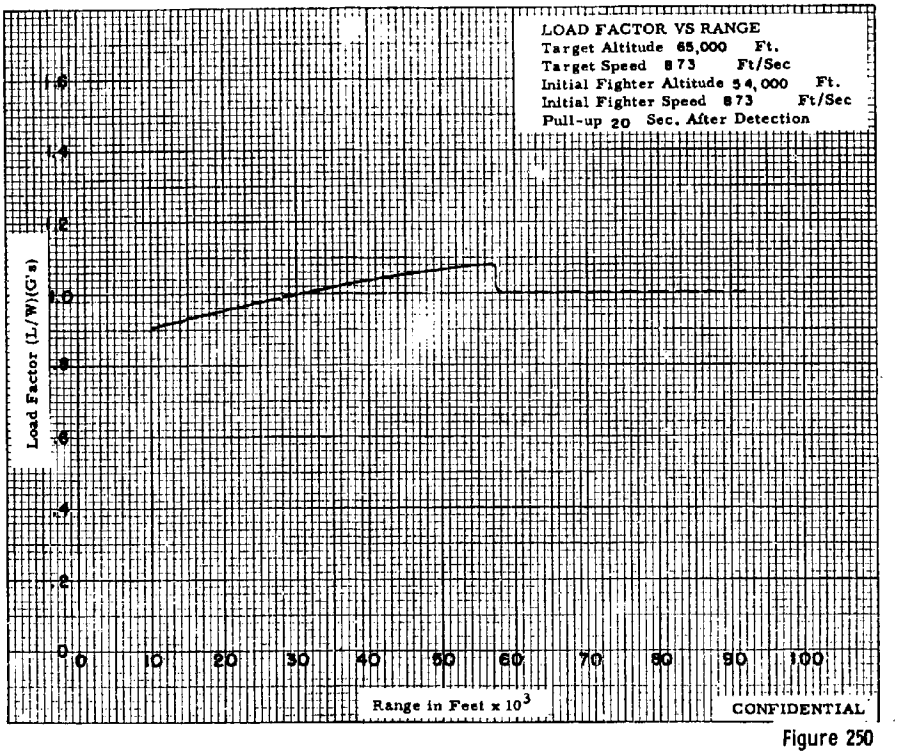

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Load Factor (L/W)(G's)
1.6
1.4
1.2
1.0
.8
.6
.4
.2
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 250

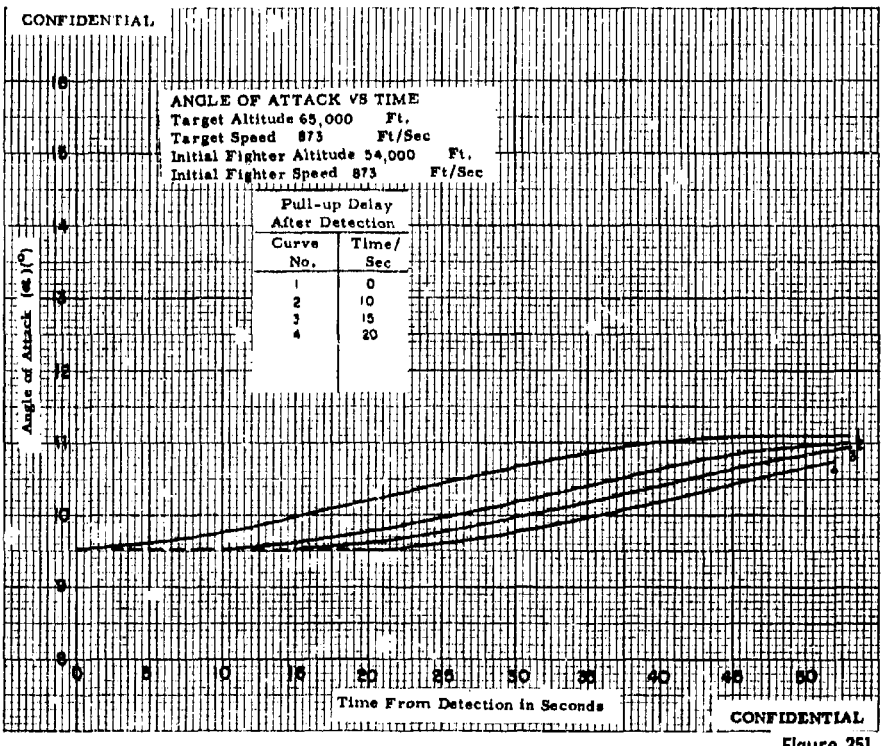


Figure 251

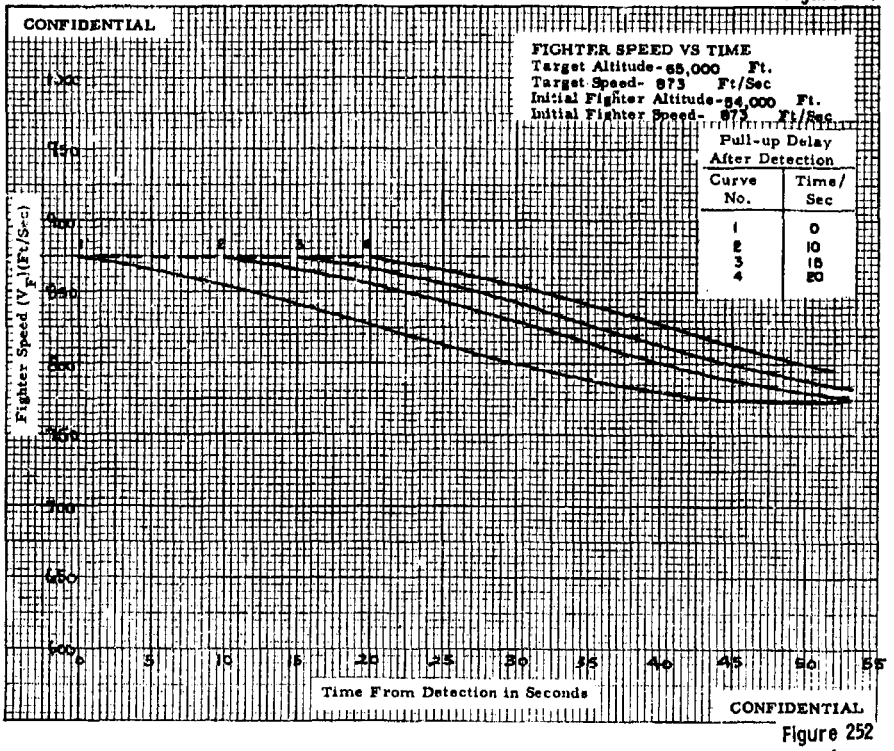


Figure 252

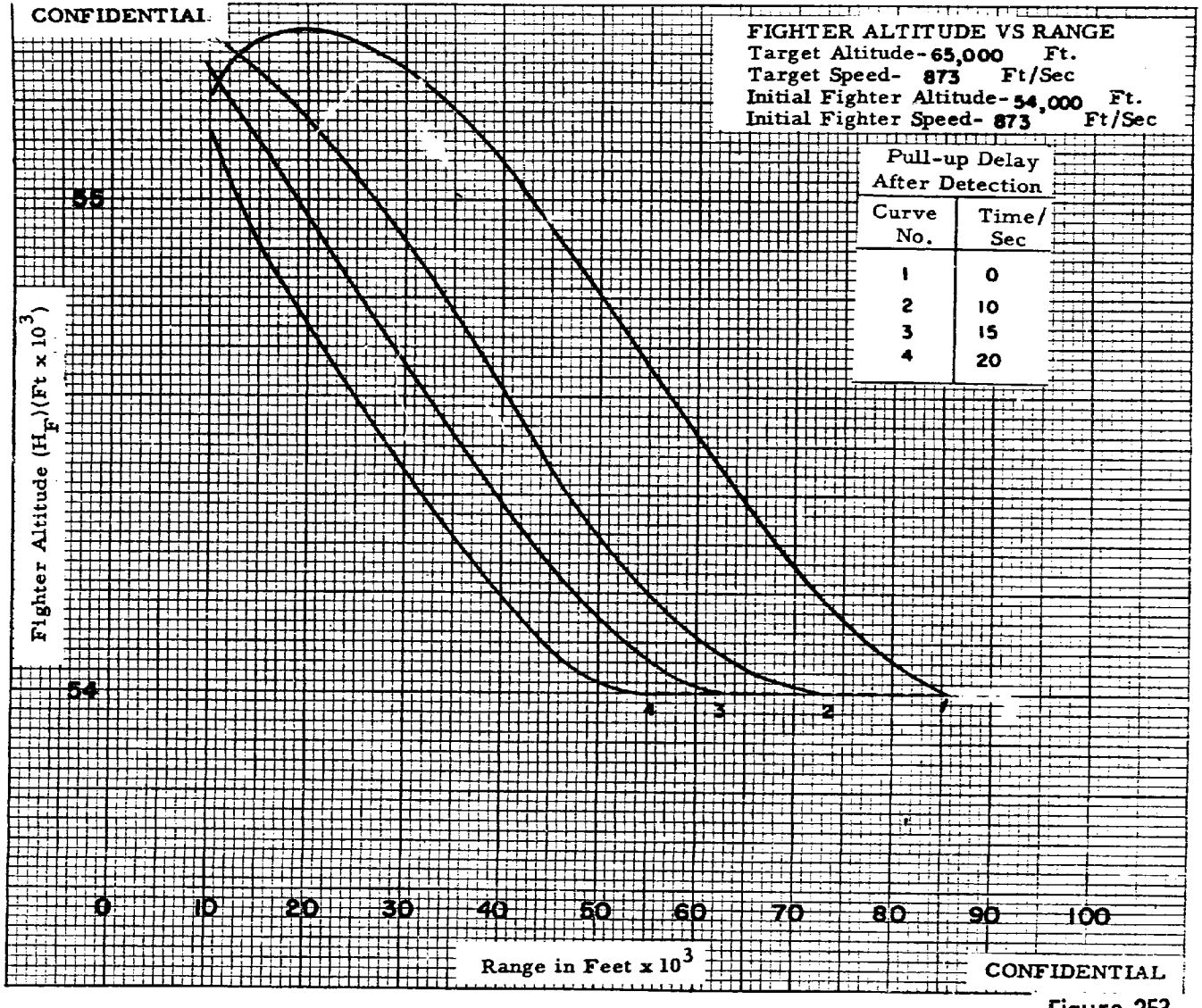
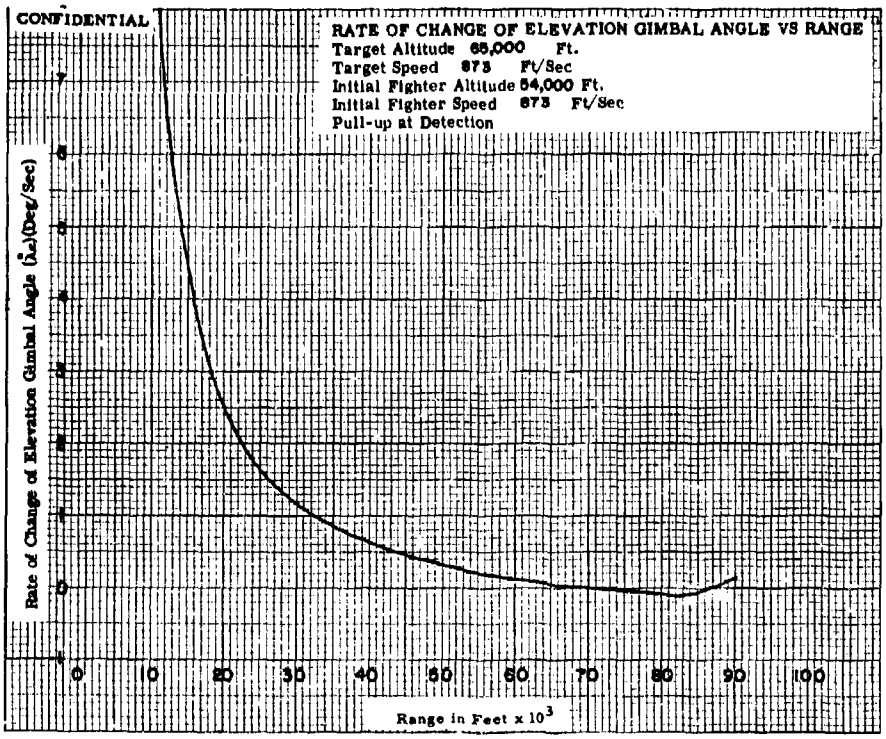

CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 54,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
3 | 15
4 | 20
Fighter Altitude (H_F)(Ft x 10^3)
55
54
4
3
2
1
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 253


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
7
6
5
4
3
2
1
0
-1
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

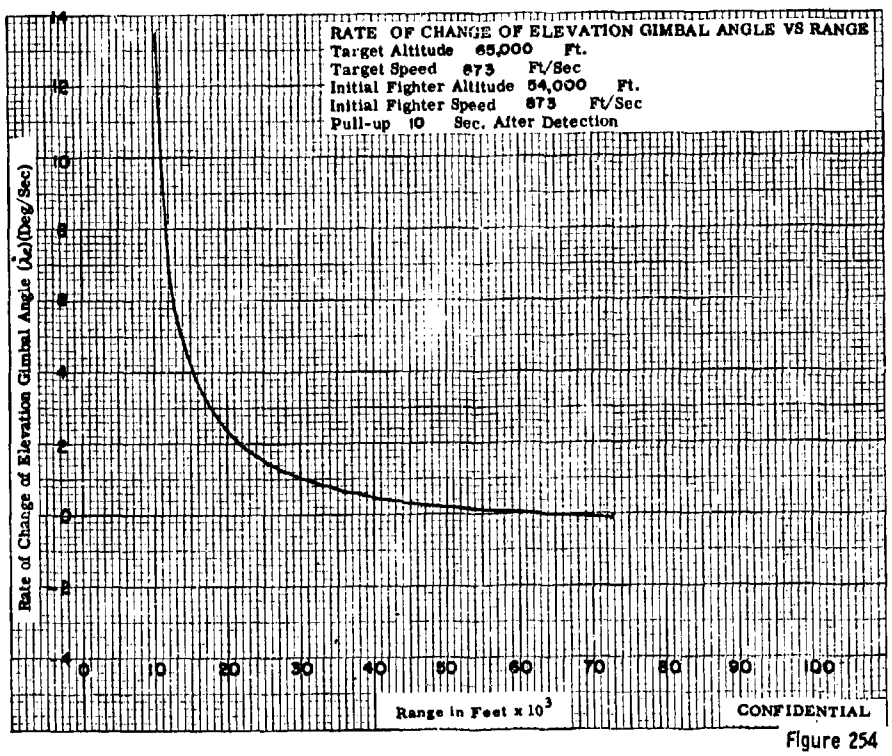
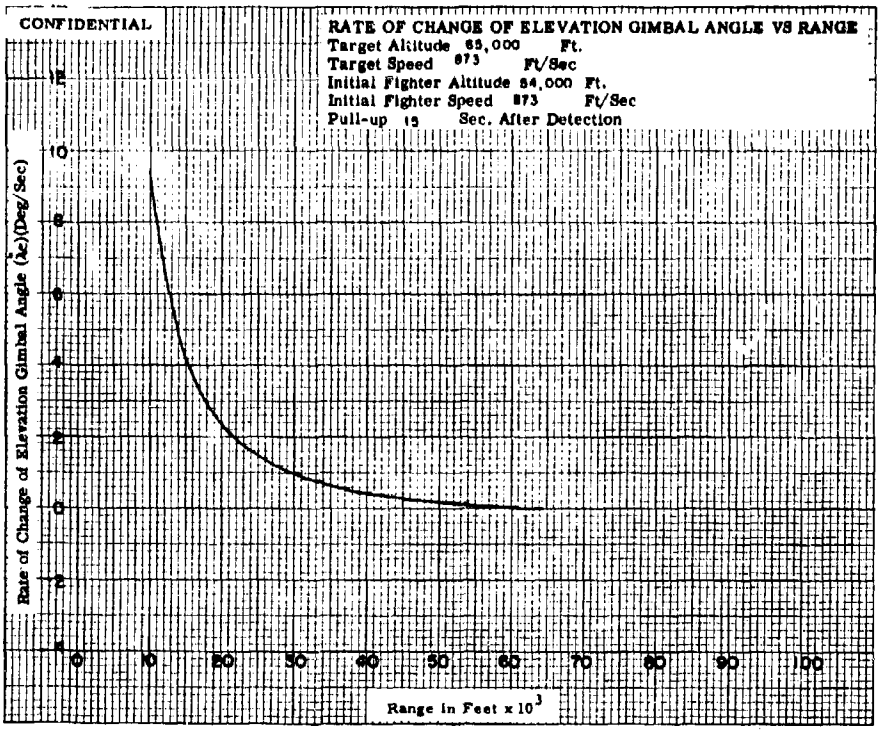

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
14
12
10
8
6
4
2
0
-2
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 254


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 64,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
12
10
8
6
4
2
0
-2
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

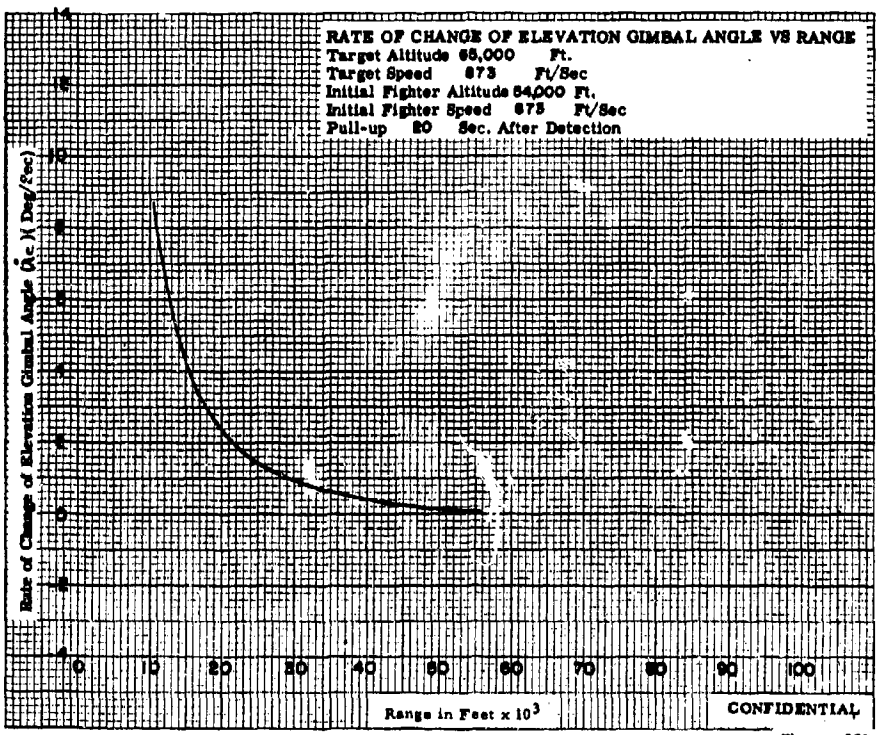

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 64,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λ̇e) Deg/Sec
14
12
10
8
6
4
2
0
-2
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 255

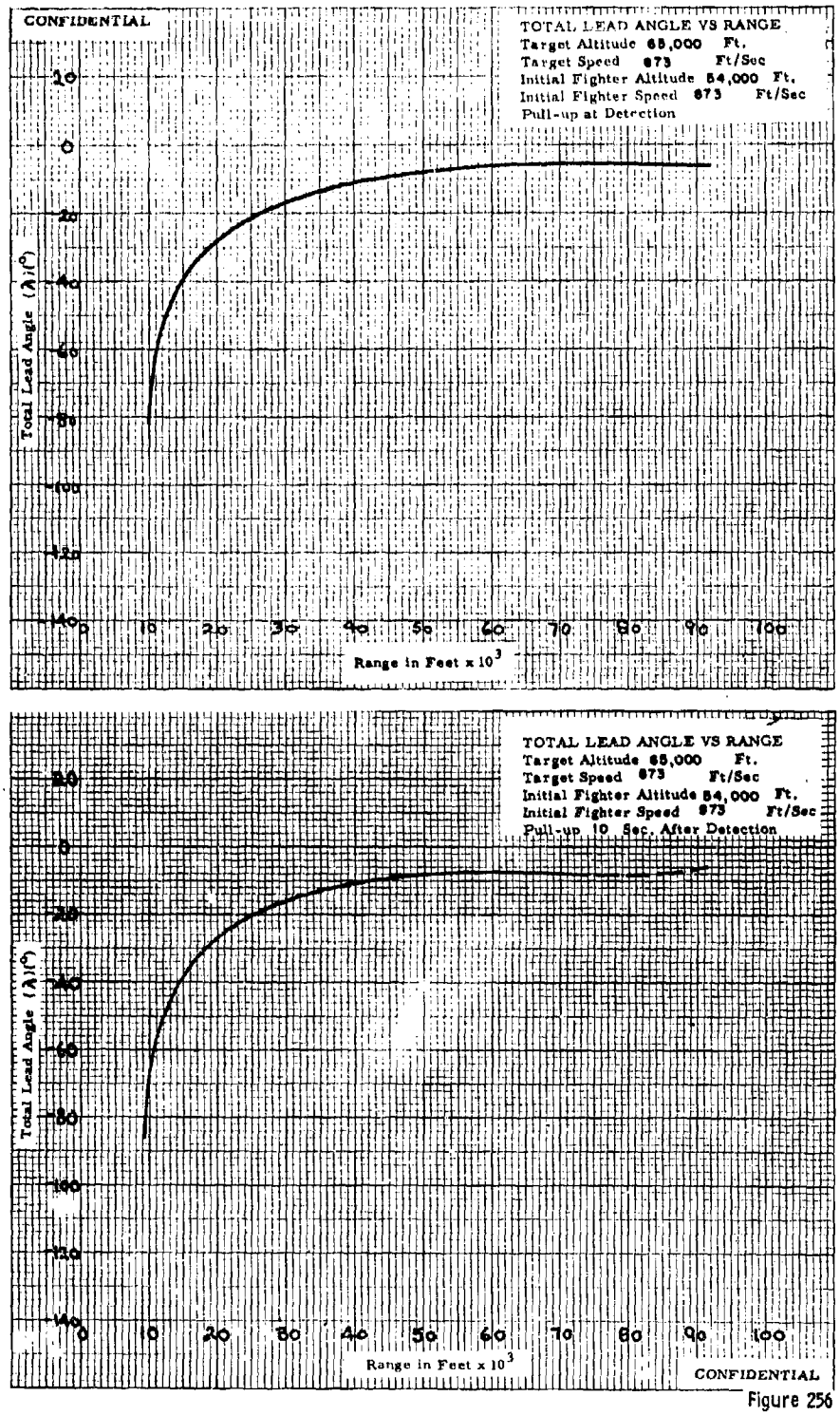
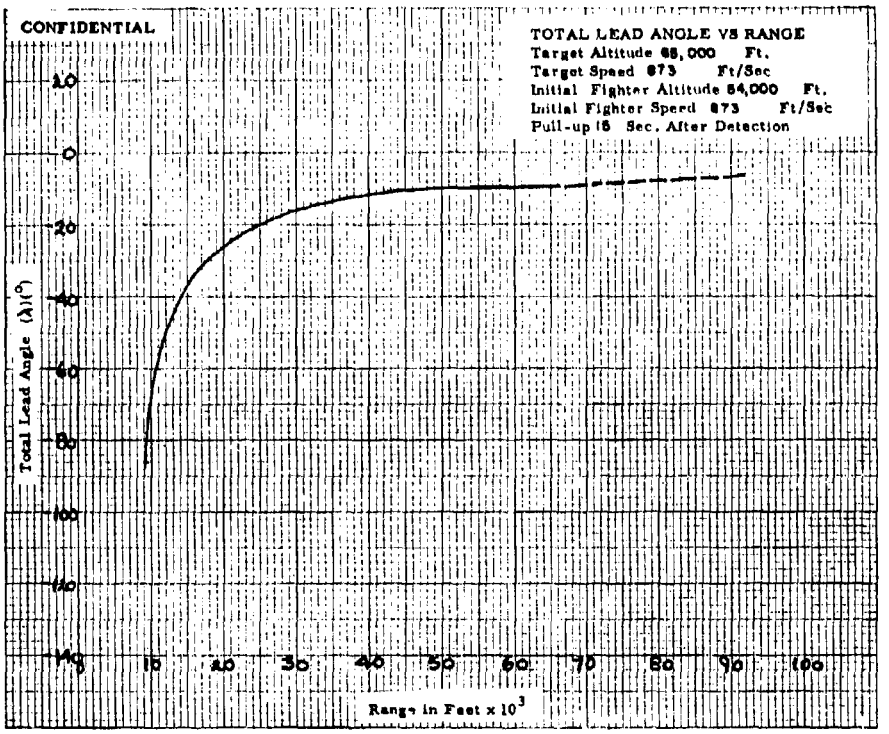

CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Total Lead Angle (λ)(°)
10
0
20
40
60
80
100
120
140
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Total Lead Angle (λ)(°)
20
0
20
40
60
80
100
120
140
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 256


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 64,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Total Lead Angle (λ)(°)
20
0
-20
-40
-60
-80
-100
-120
-140
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

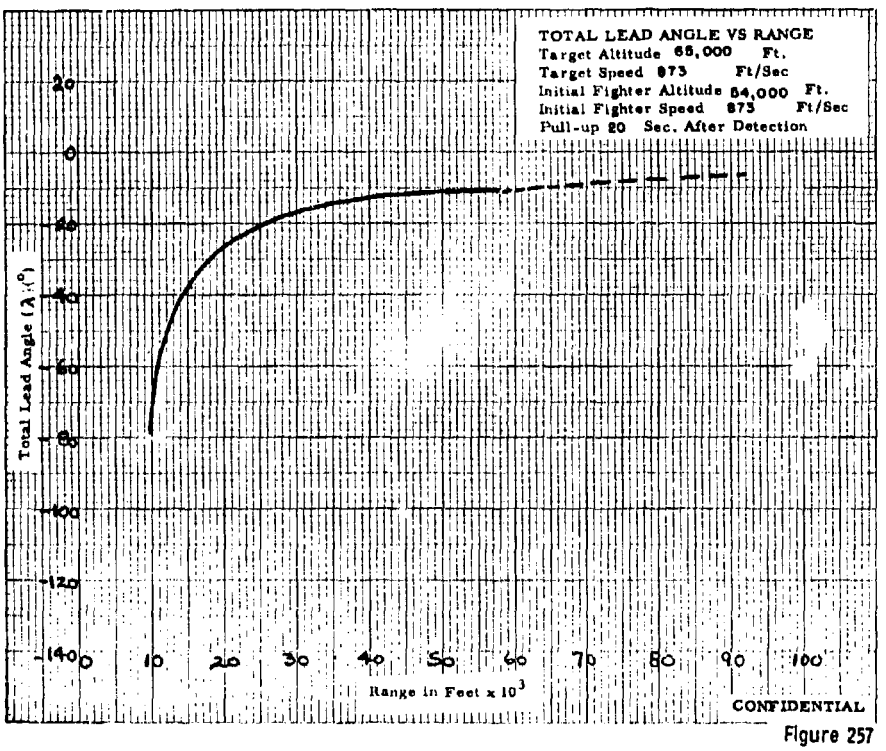
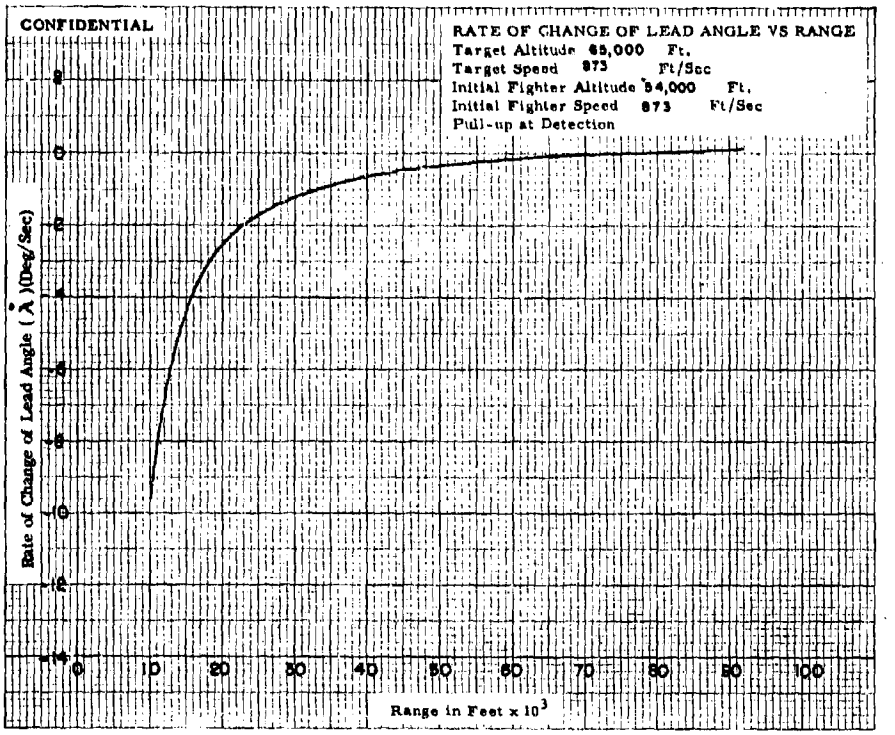

TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 64,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Total Lead Angle (λ)(°)
20
0
-20
-40
-60
-80
-100
-120
-140
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 257


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle ($\dot{\lambda}$) (Deg/Sec)
0
2
4
6
8
10
12
14
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

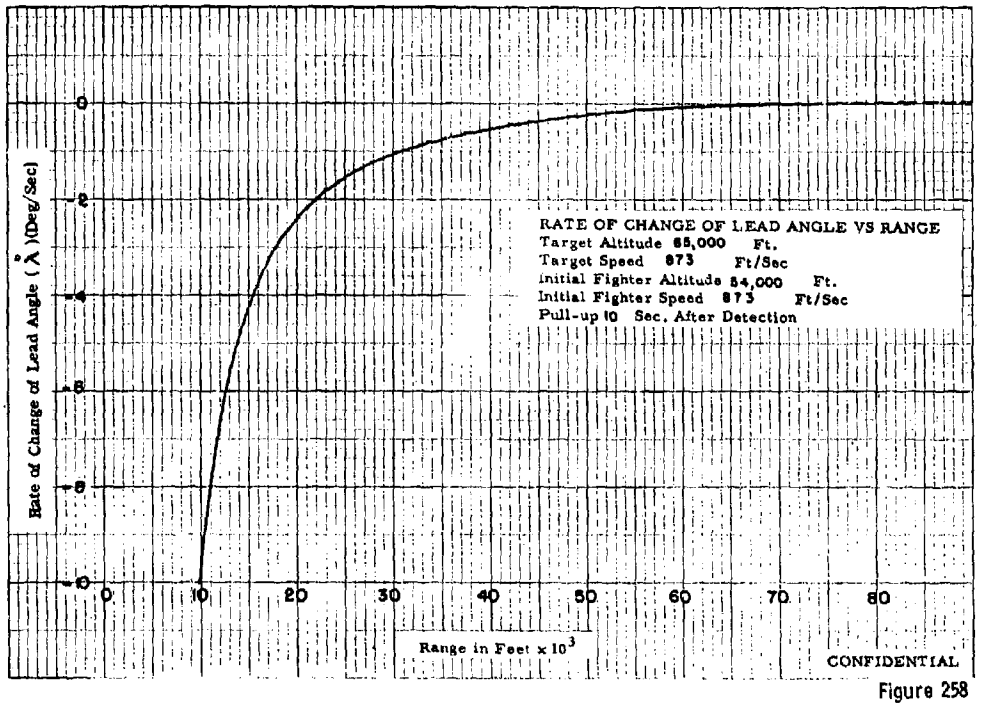
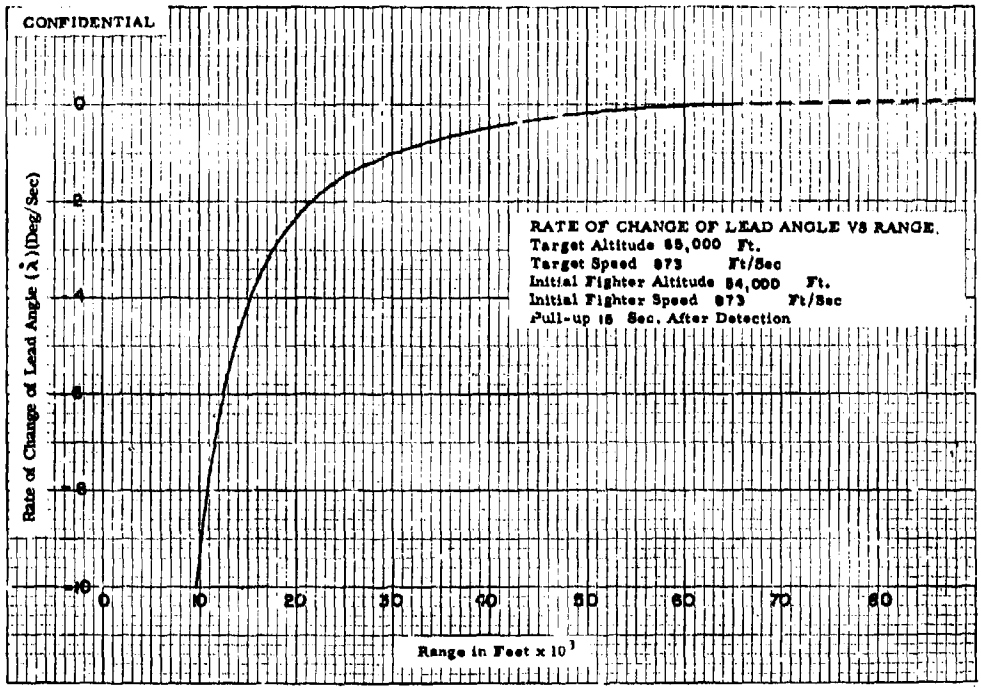

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle ($\dot{\lambda}$) (Deg/Sec)
0
2
4
6
8
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 258


RATE OF CHANGE OF LEAD ANGLE VS RANGE.
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

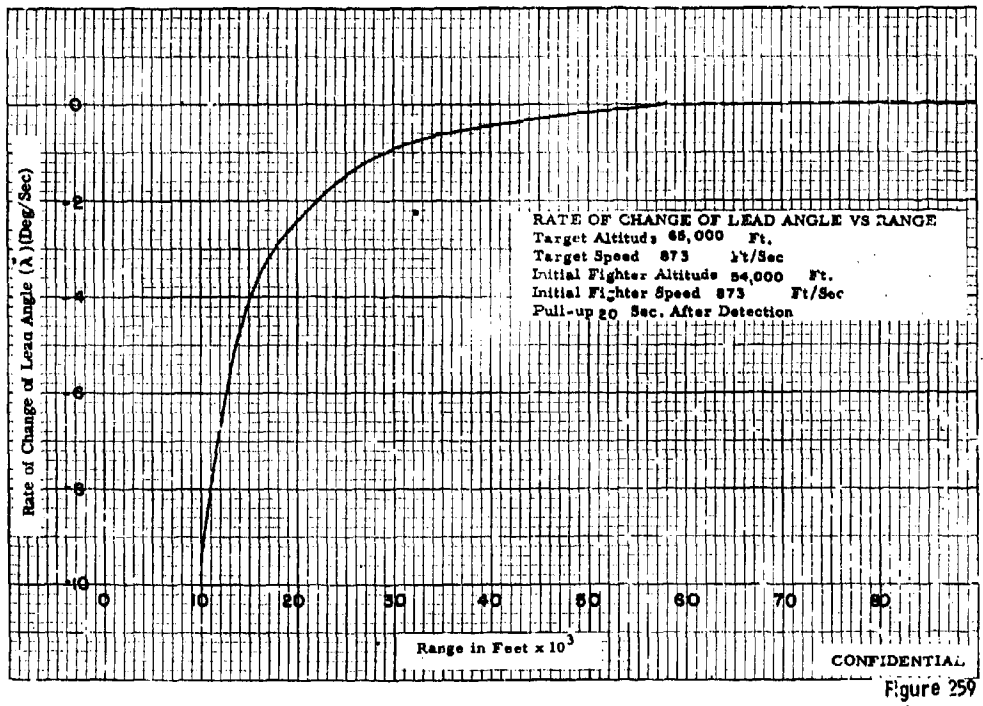
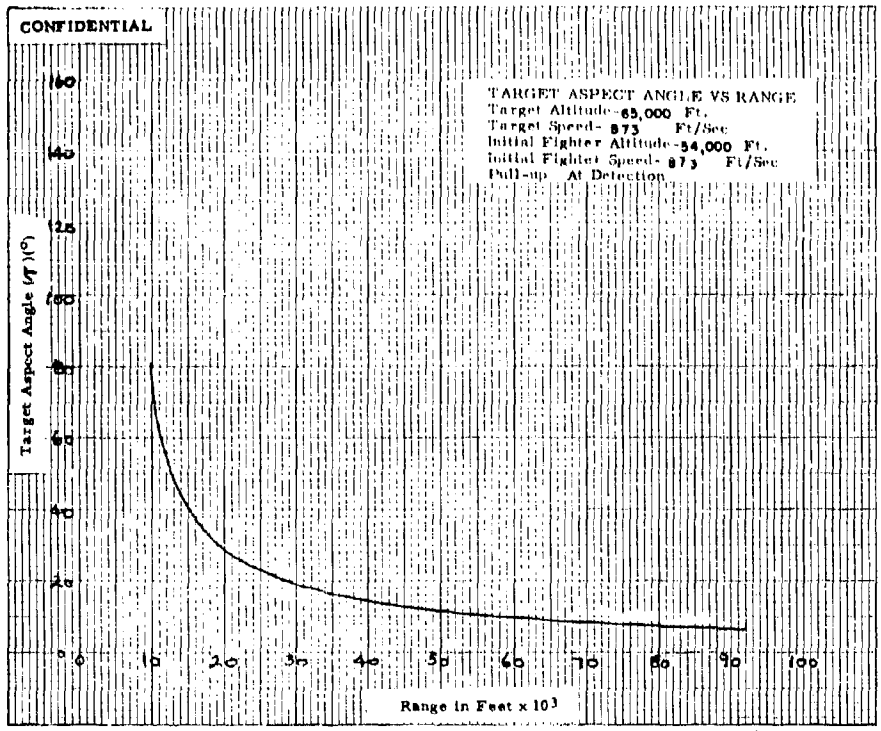

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 54,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

Figure 259


TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-54,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up At Detection
Target Aspect Angle (ψ)(°)
Range in Feet x 10³

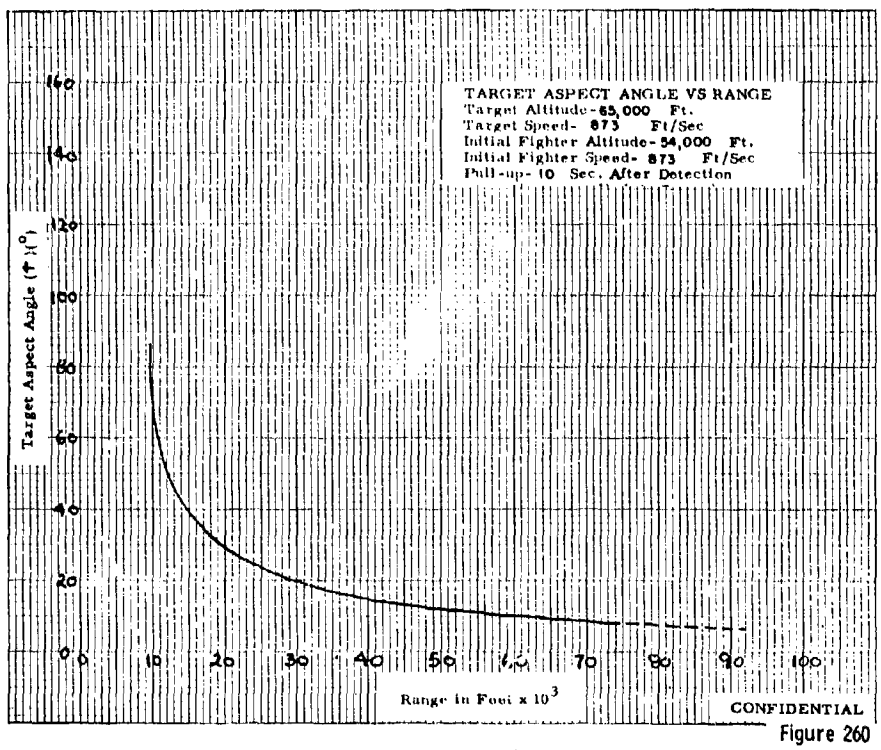
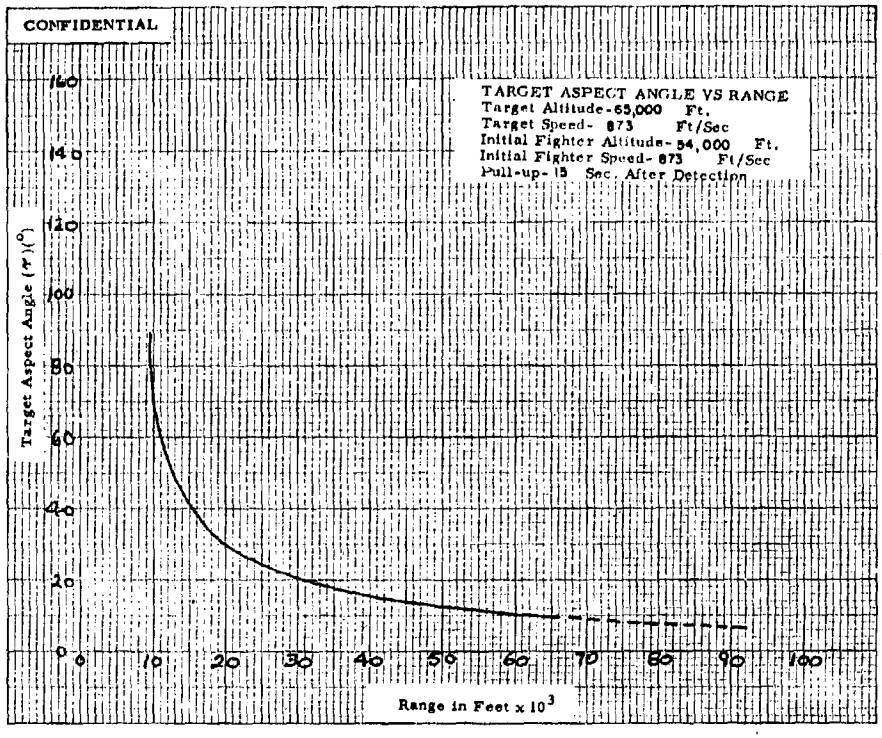

TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-54,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 10 Sec. After Detection
Target Aspect Angle (ψ)(°)
Range in Feet x 10³

Figure 260


TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-54,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 15 Sec. After Detection
Target Aspect Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

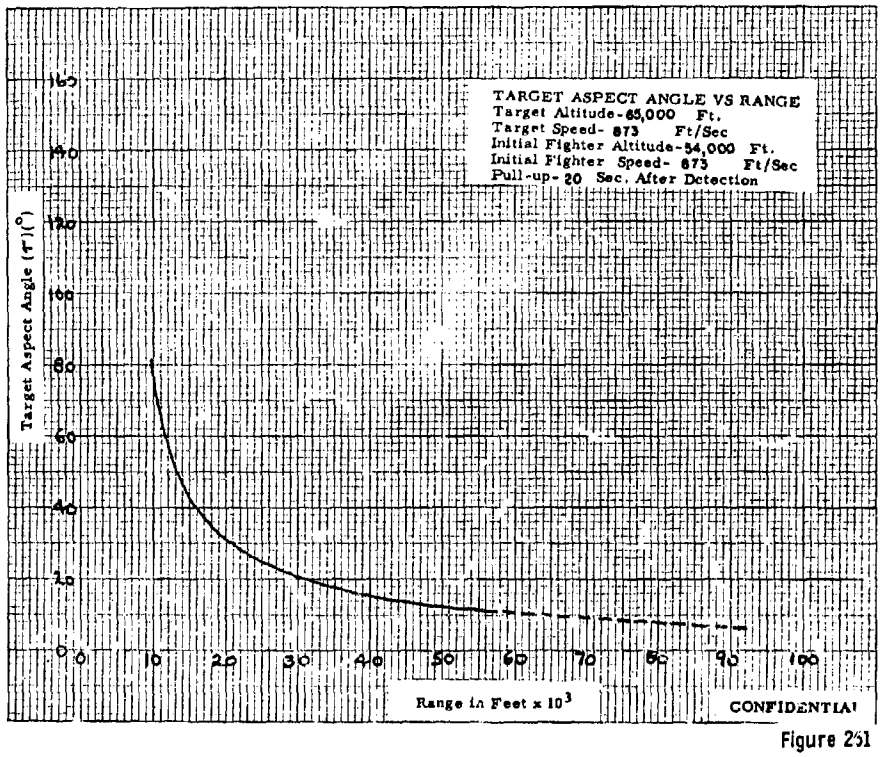
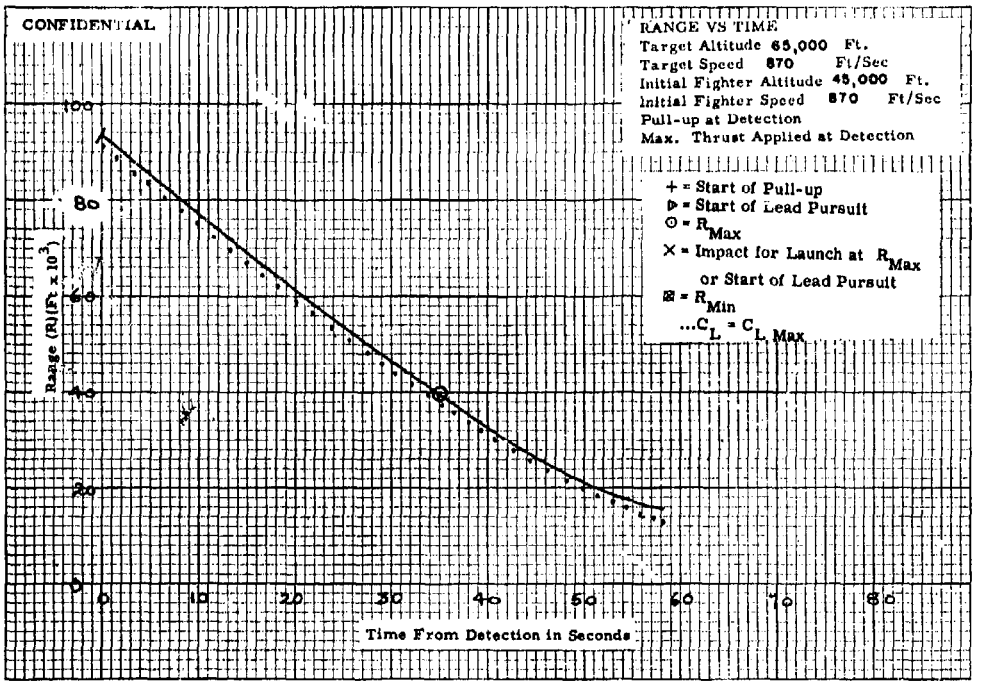

TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-54,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 20 Sec. After Detection
Target Aspect Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 251


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
Time From Detection in Seconds

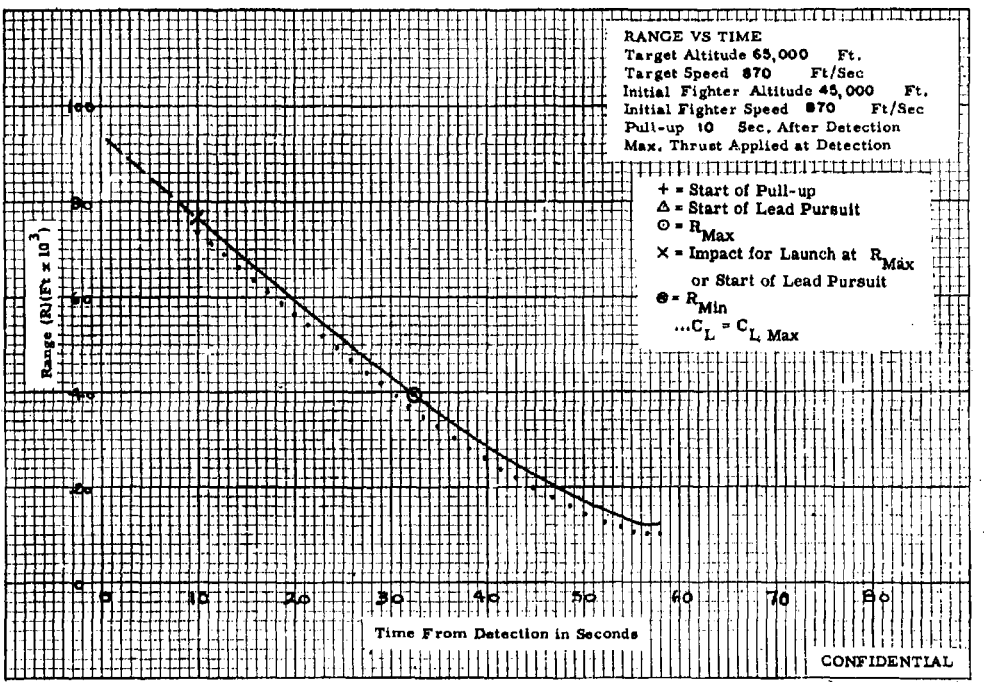
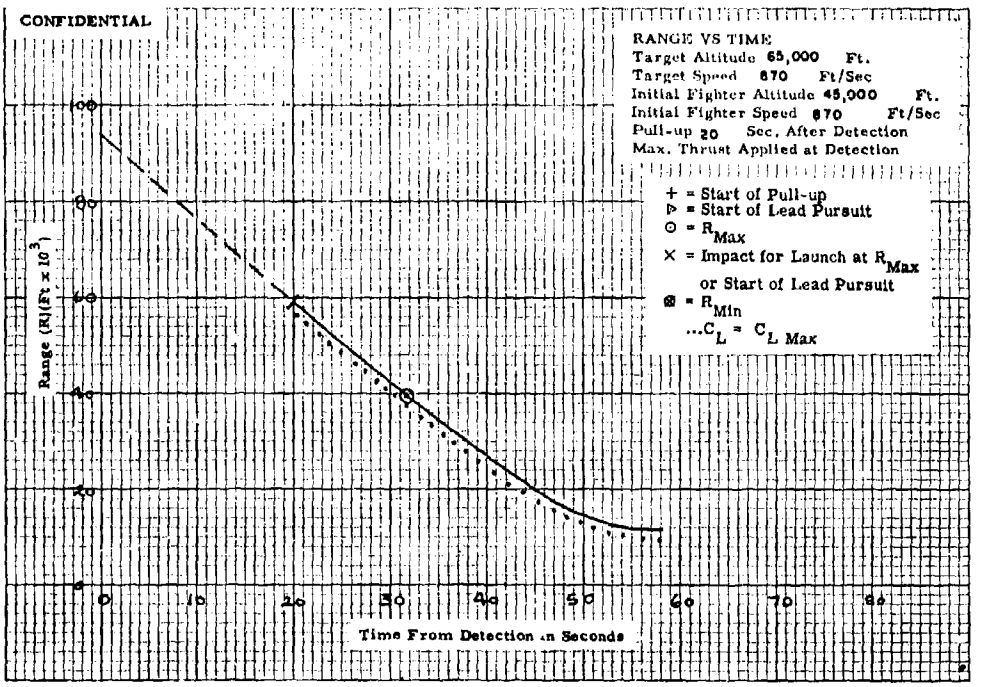

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
Time From Detection in Seconds
CONFIDENTIAL

Figure 262


RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds

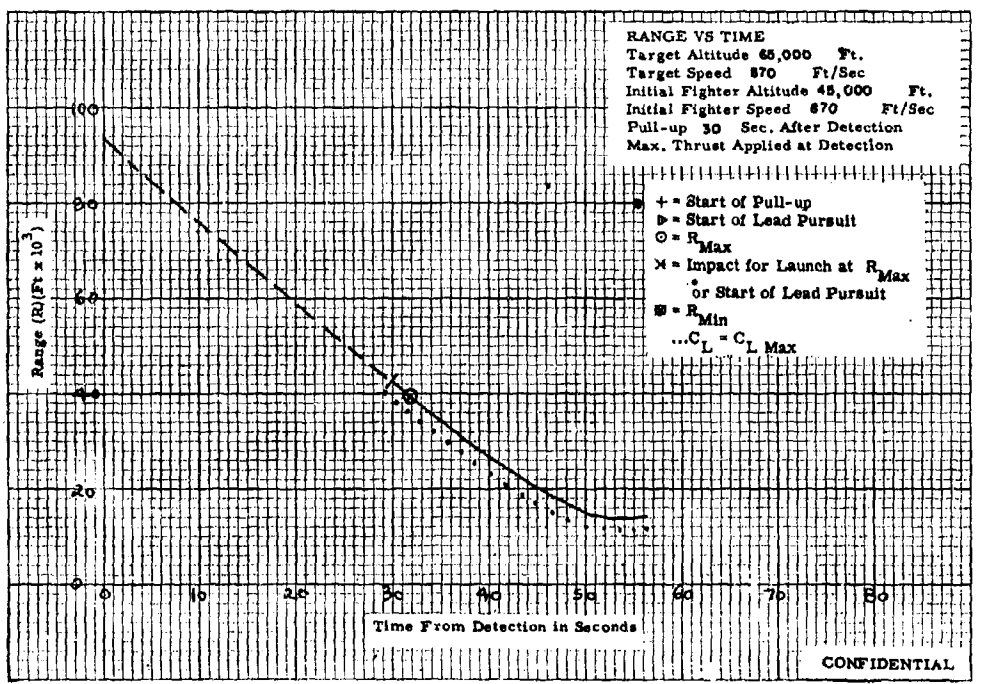

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 263

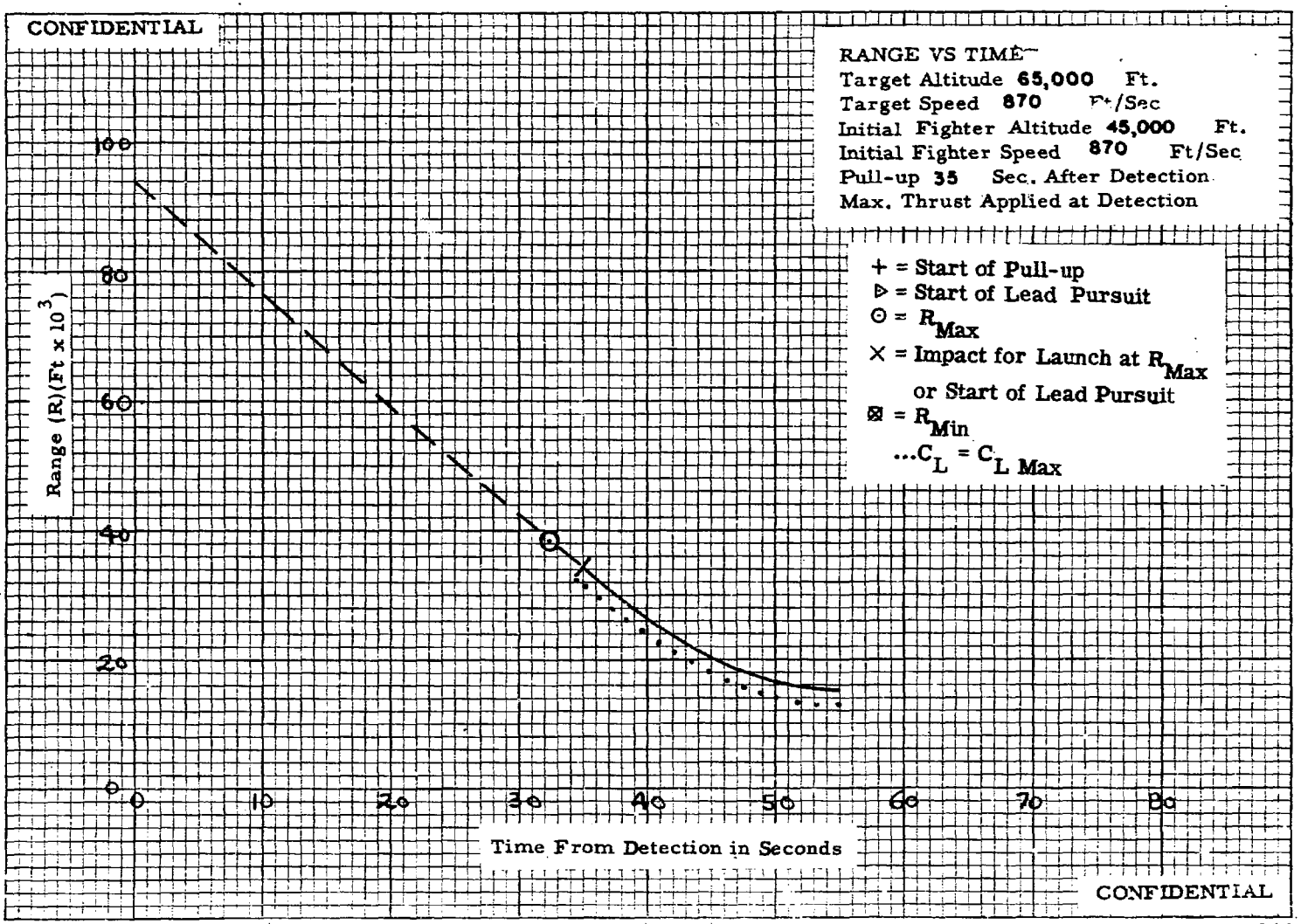
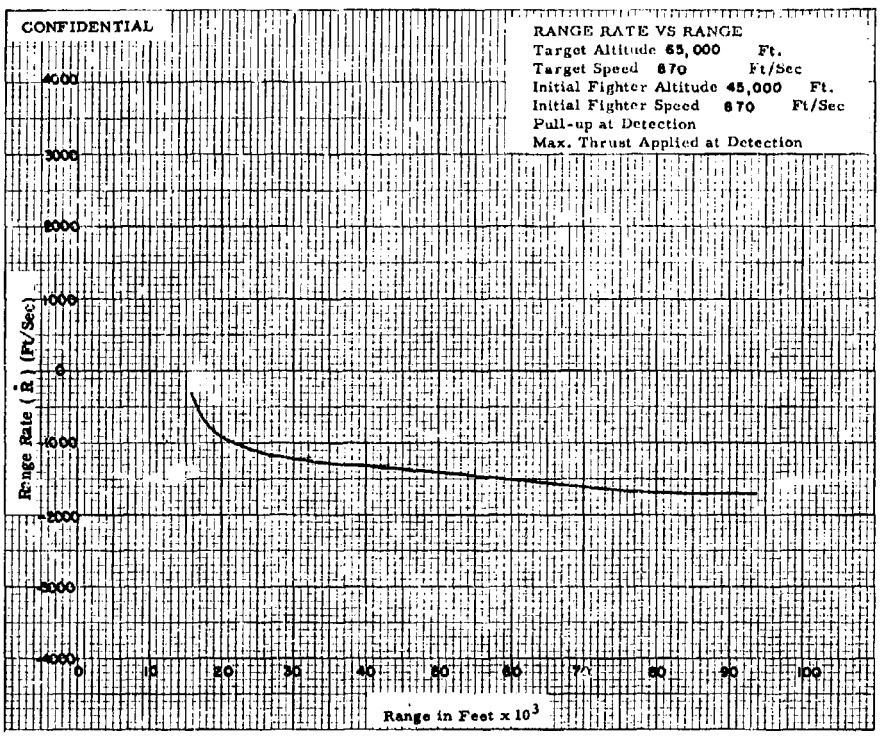

CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
Time From Detection in Seconds
CONFIDENTIAL

Figure 264


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

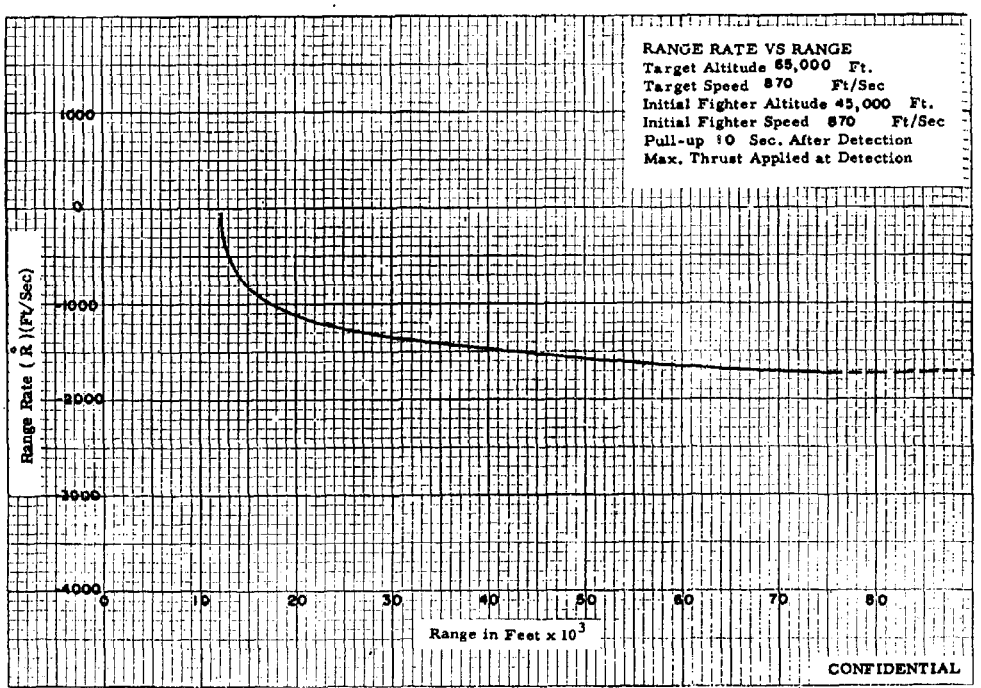
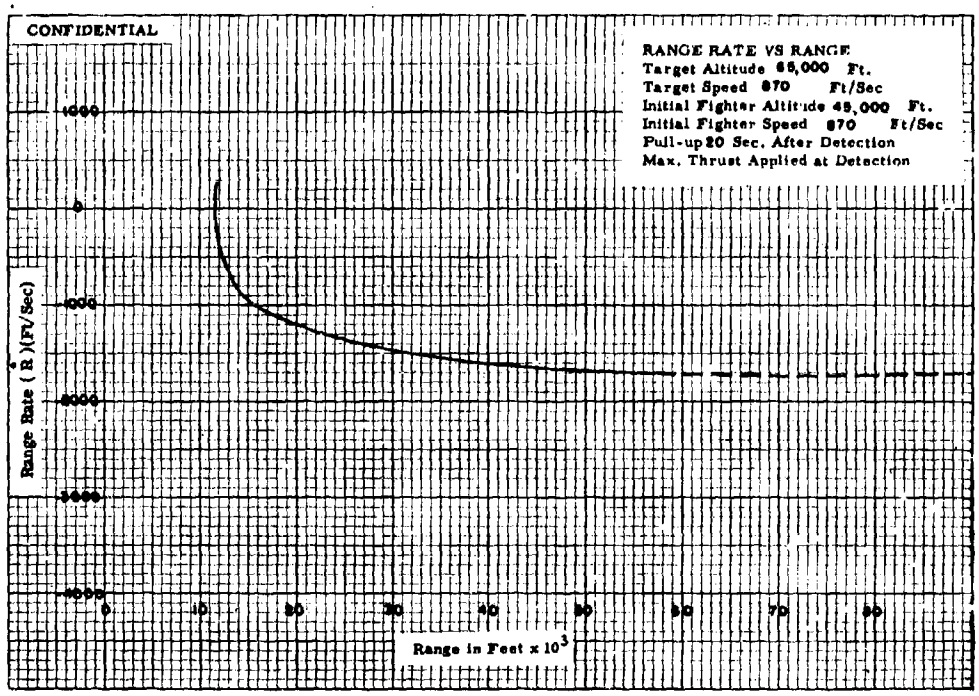

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 265


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
Range in Feet x 10³

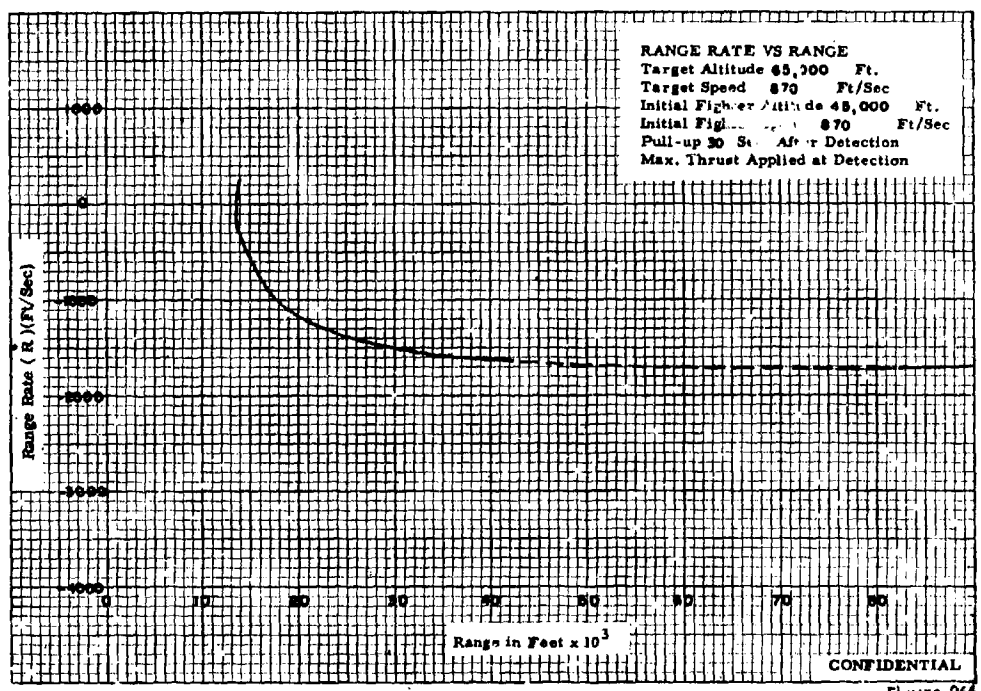

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
Range in Feet x 10³
CONFIDENTIAL

Figure 266

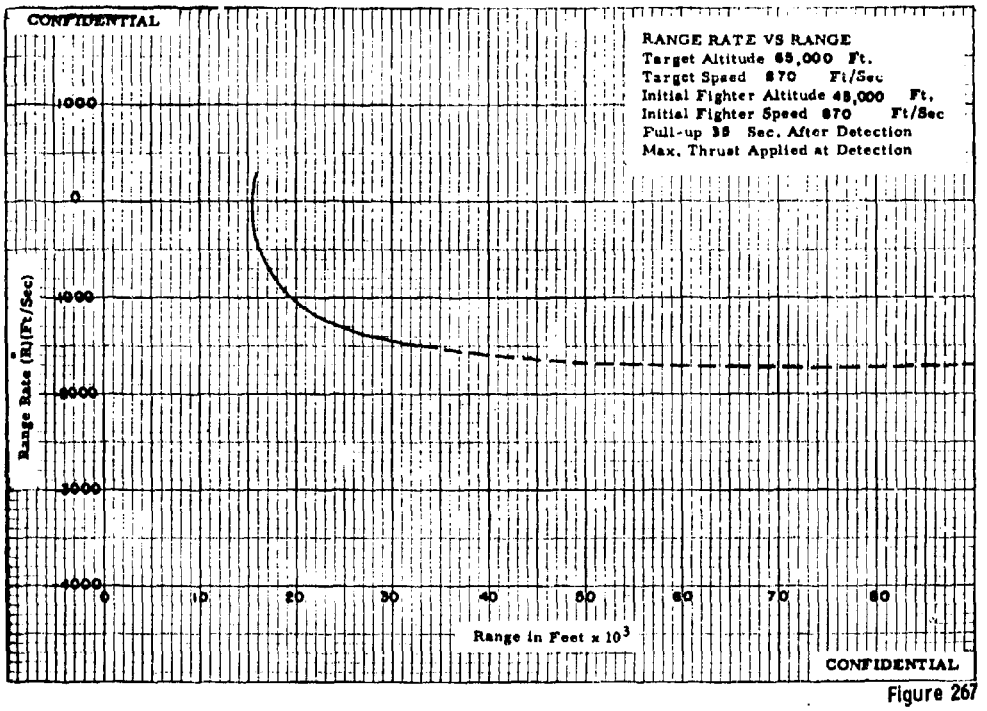


Figure 267

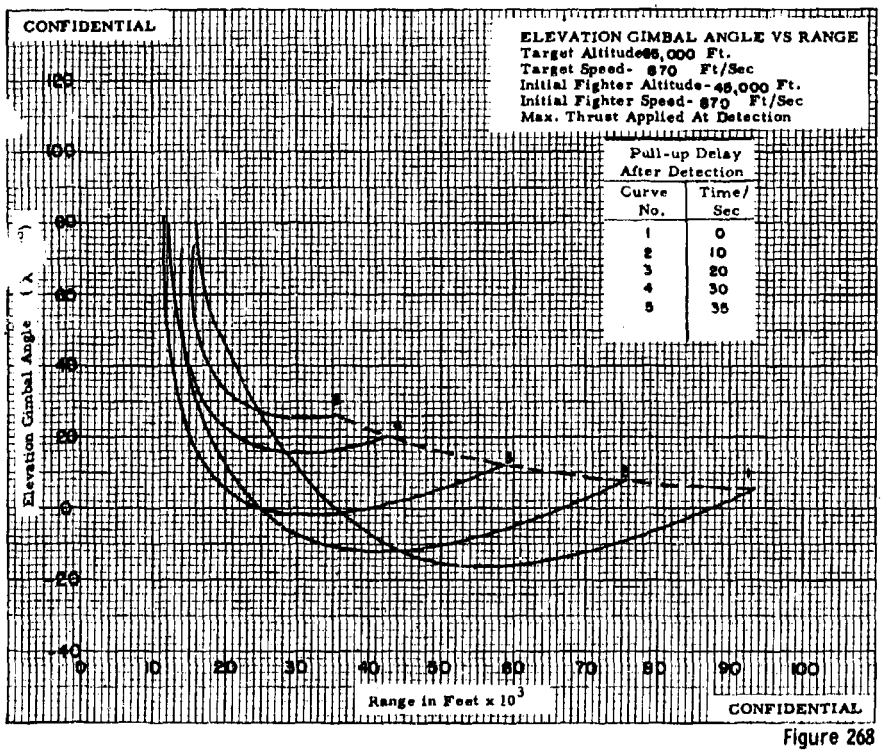
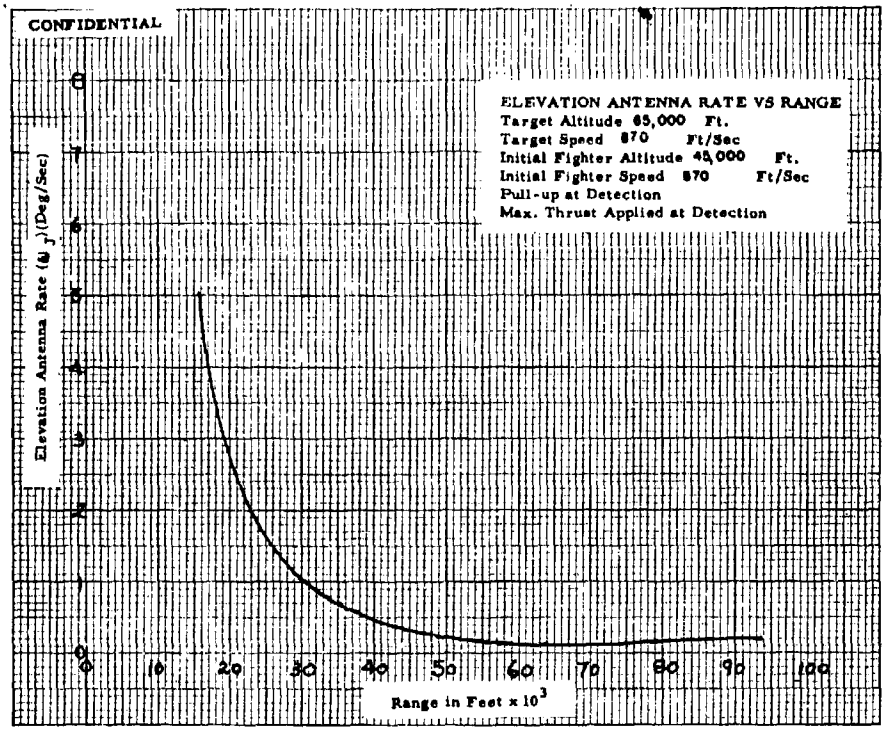


Figure 268


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate ($\dot{\theta}_y$) (Deg/Sec)
0 1 2 3 4 5 6 7 8
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

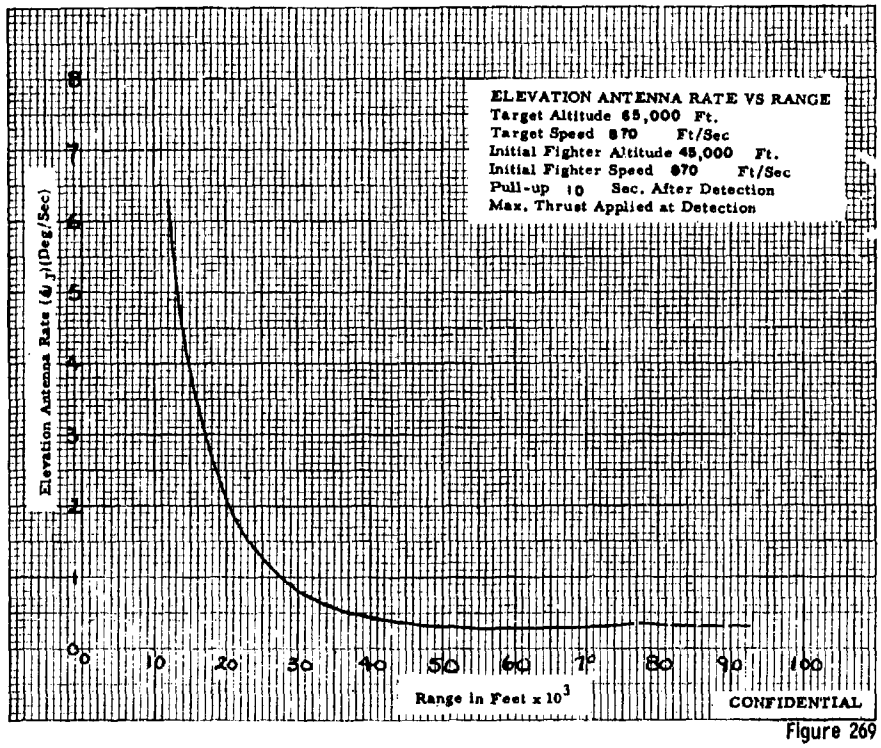
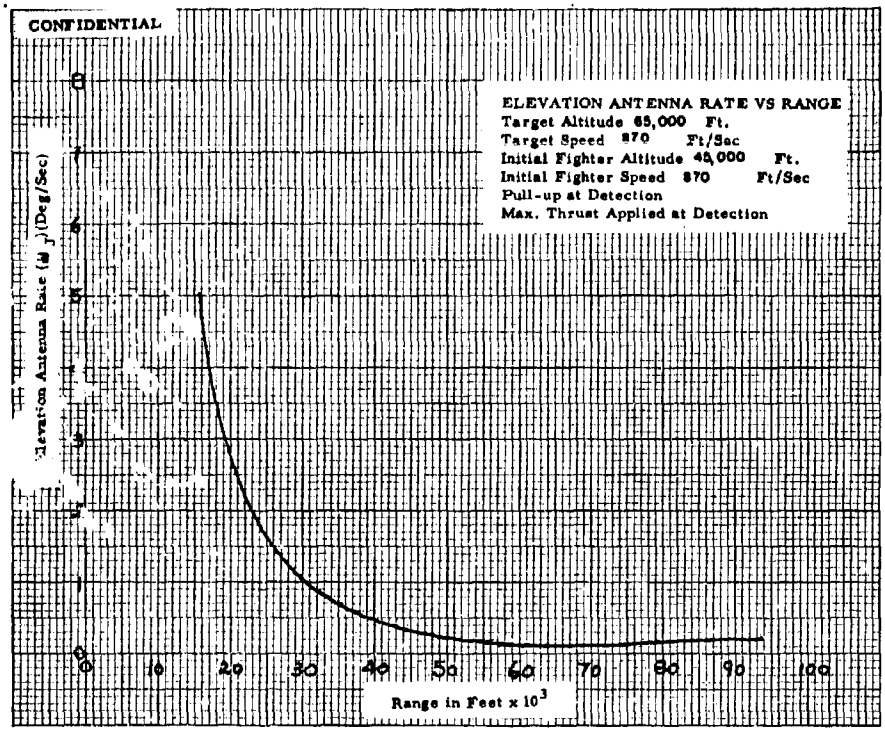

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate ($\dot{\theta}_y$) (Deg/Sec)
0 1 2 3 4 5 6 7 8
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

Figure 269


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate ($\dot{\theta}_T$)(Deg/Sec)
0
1
2
3
4
5
6
7
8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

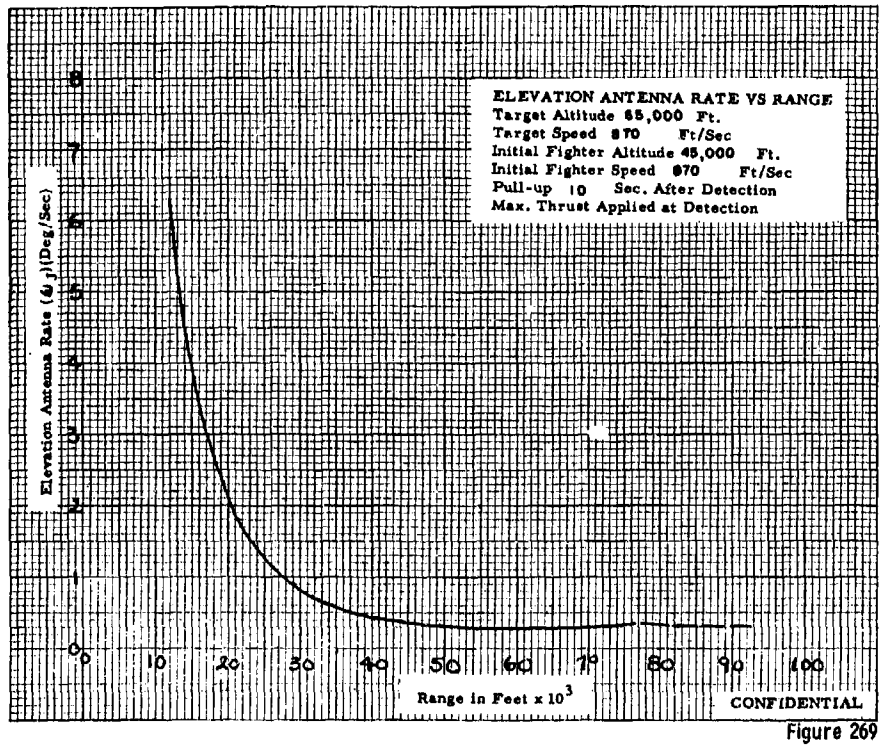

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate ($\dot{\theta}_T$)(Deg/Sec)
0
1
2
3
4
5
6
7
8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 269

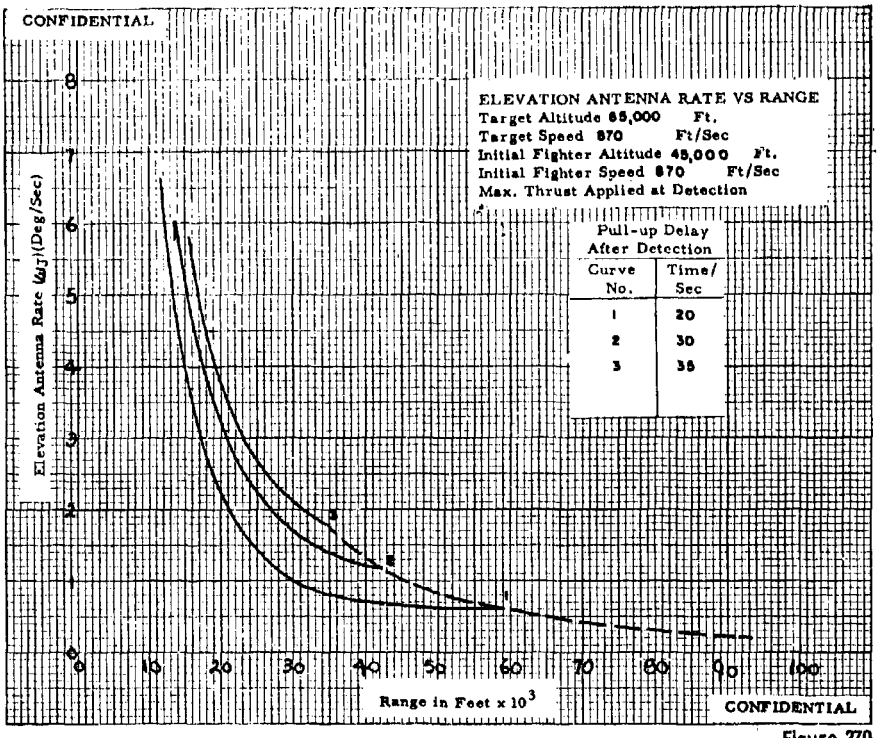


Figure 270

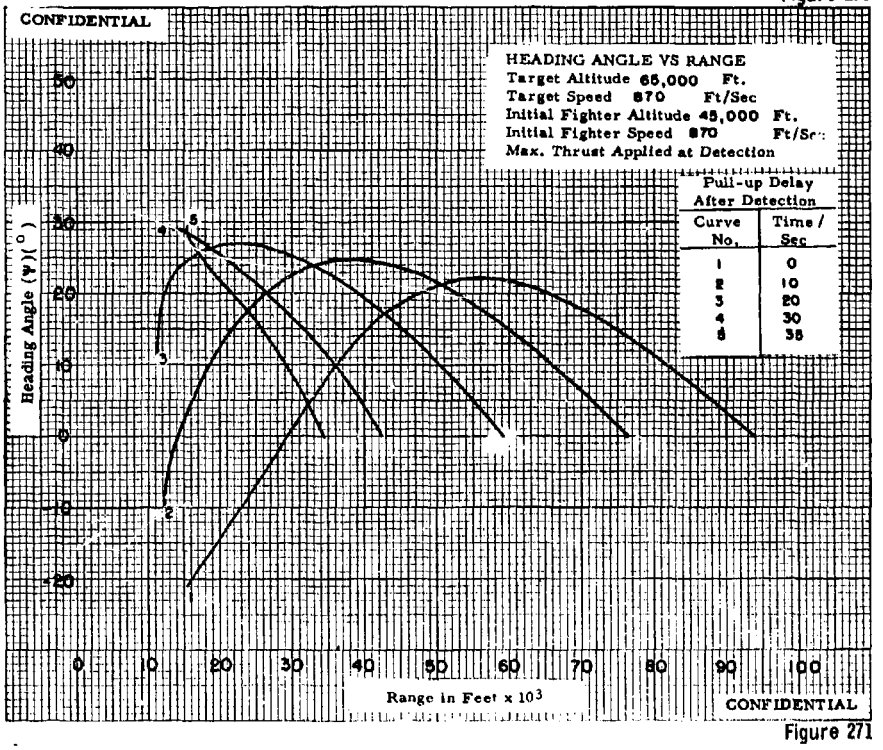


Figure 271

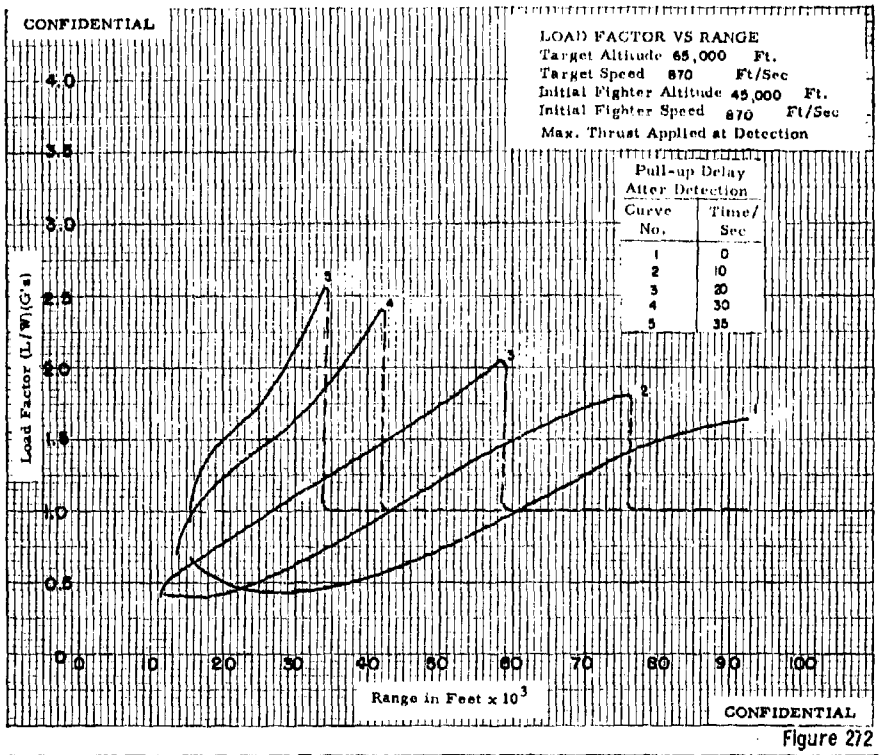


Figure 272

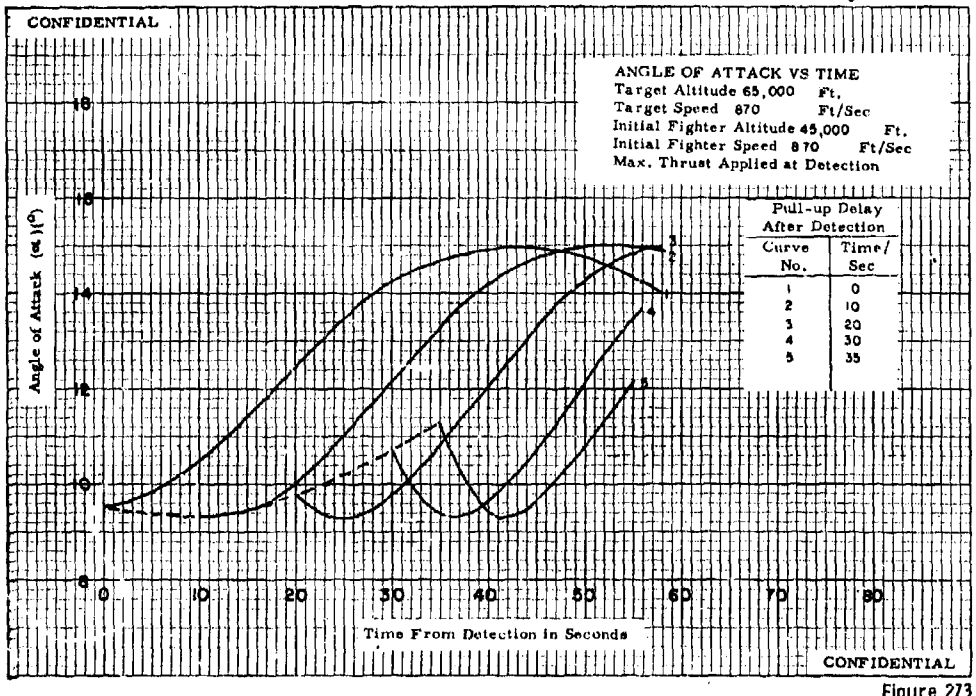


Figure 273

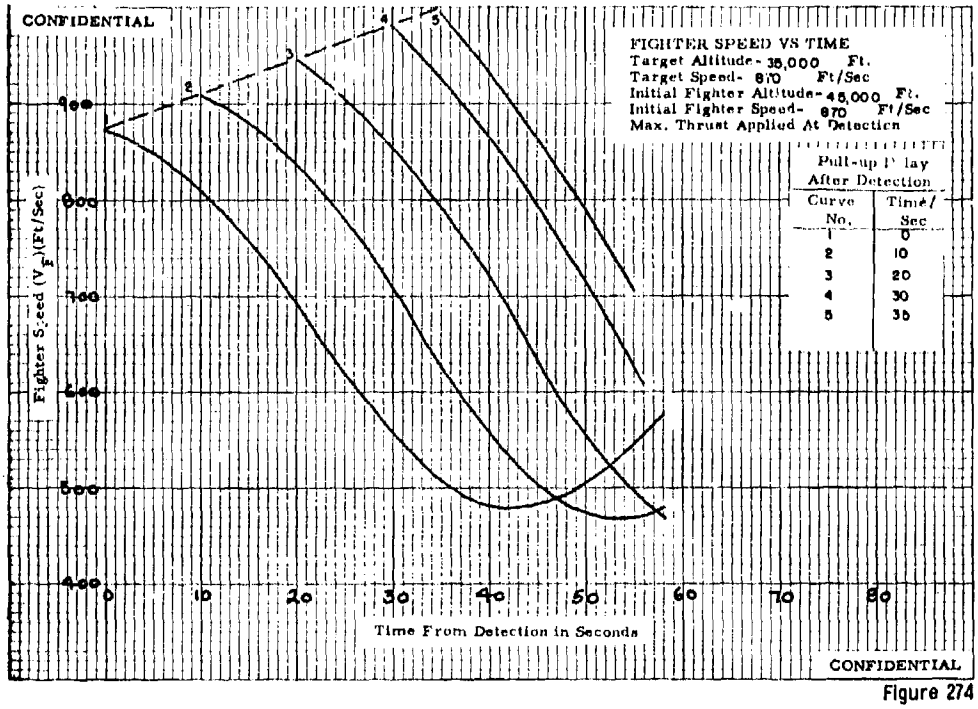


Figure 274

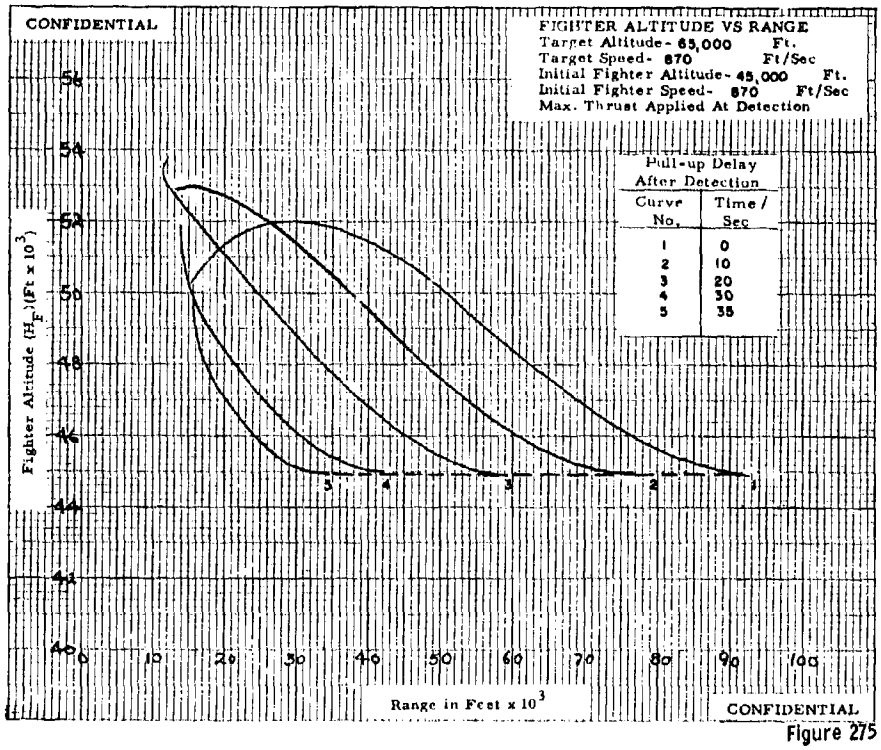
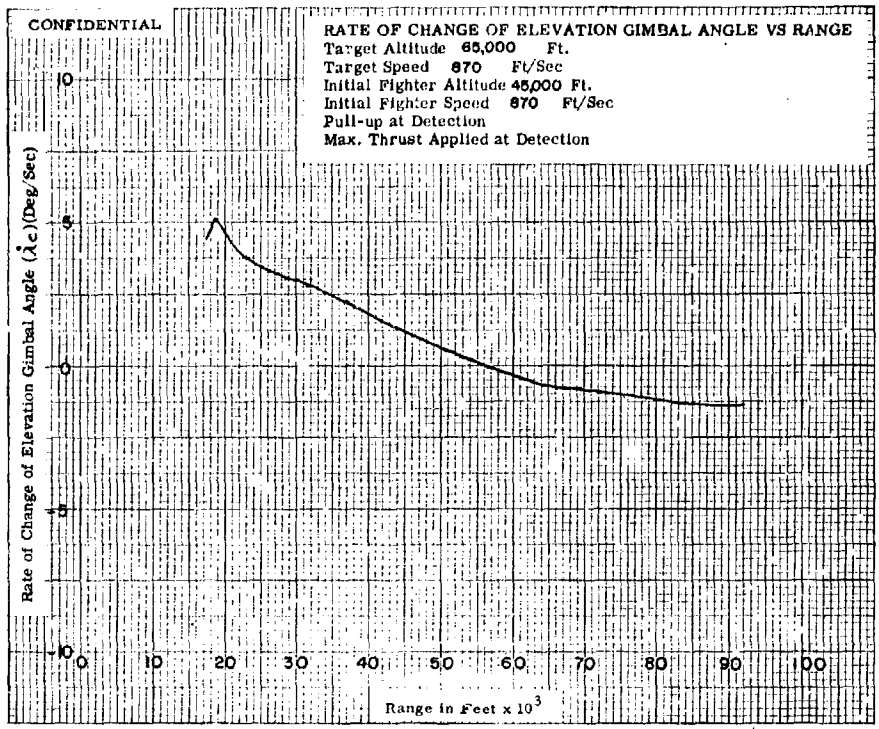


Figure 275


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

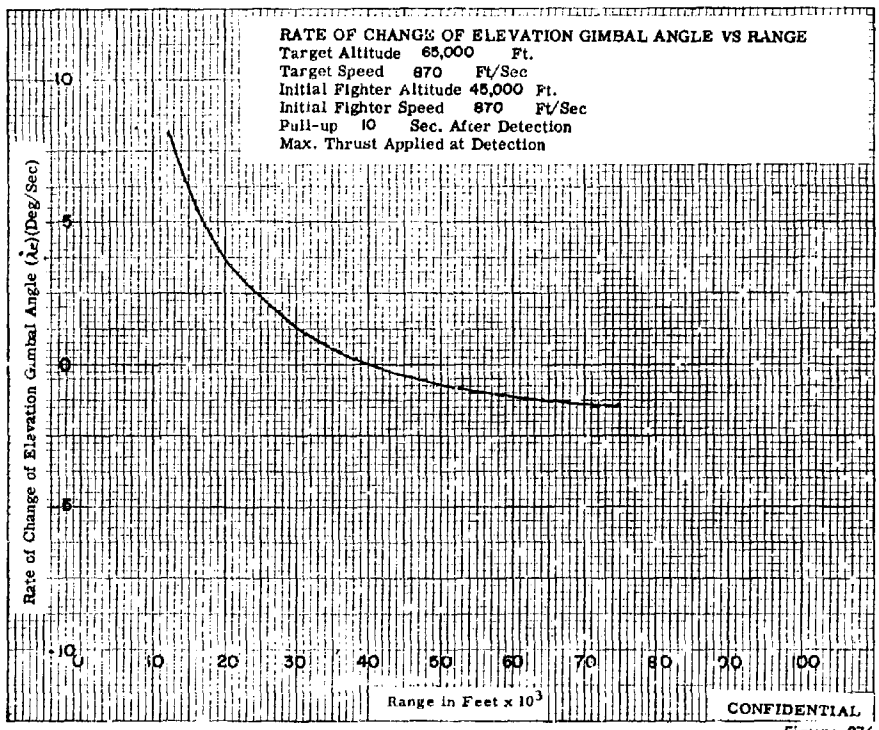
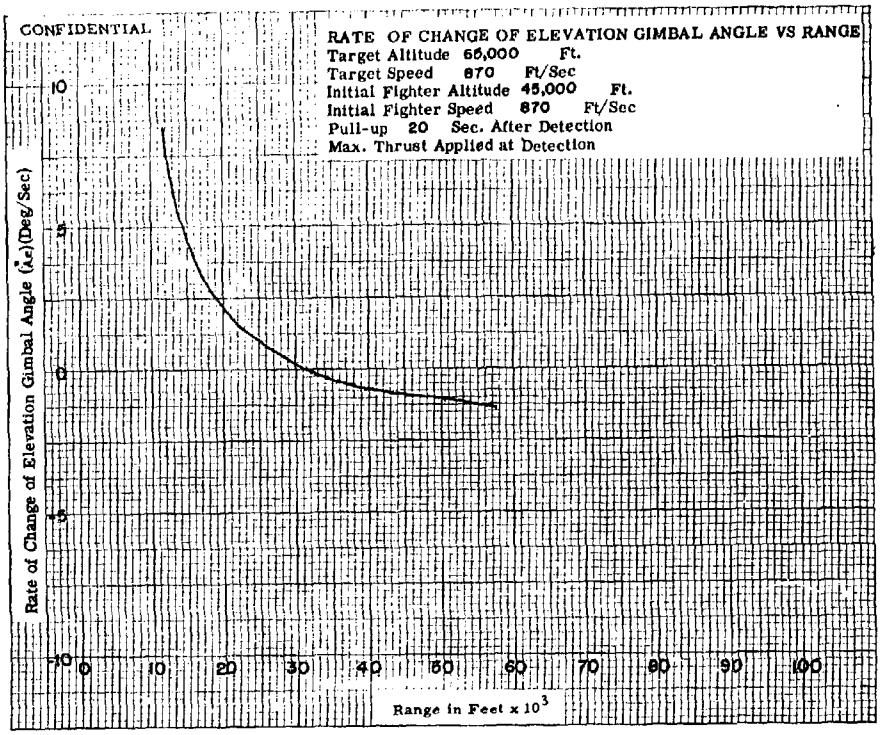

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 276


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

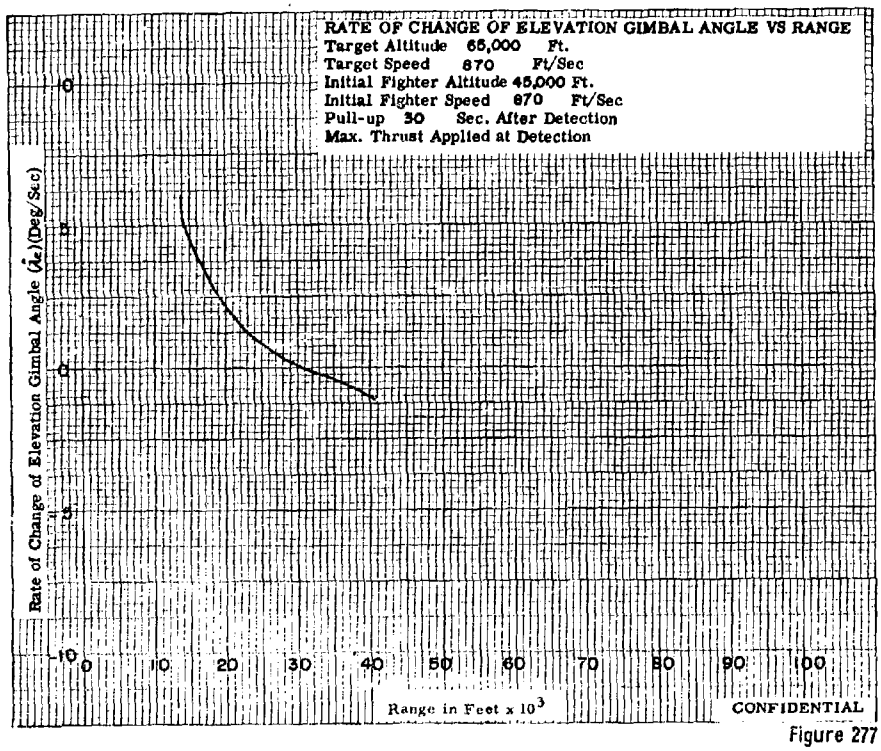

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 277

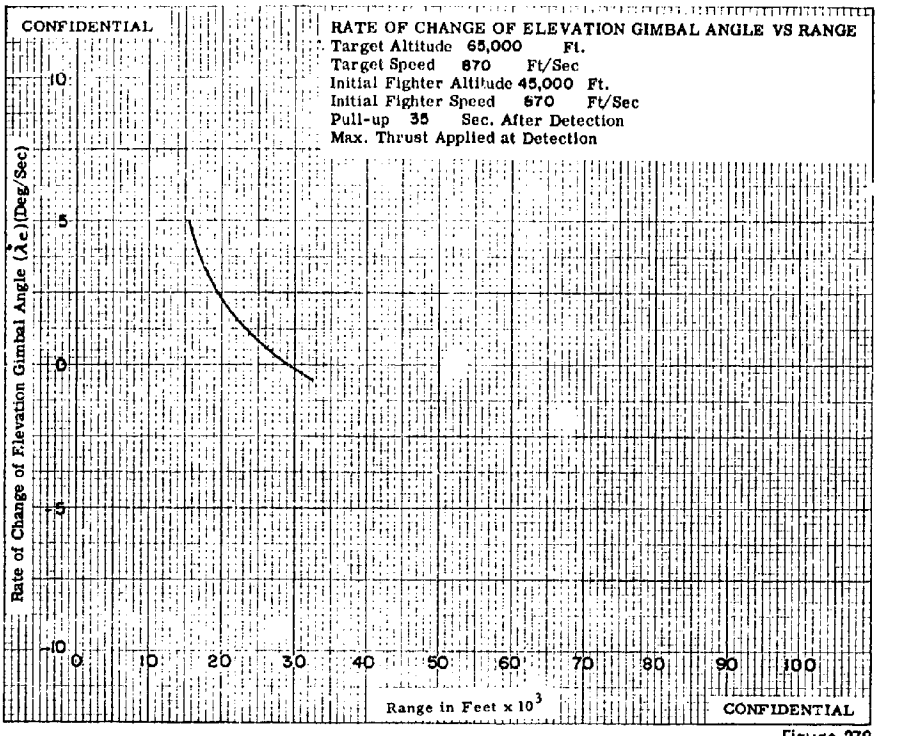


Figure 278

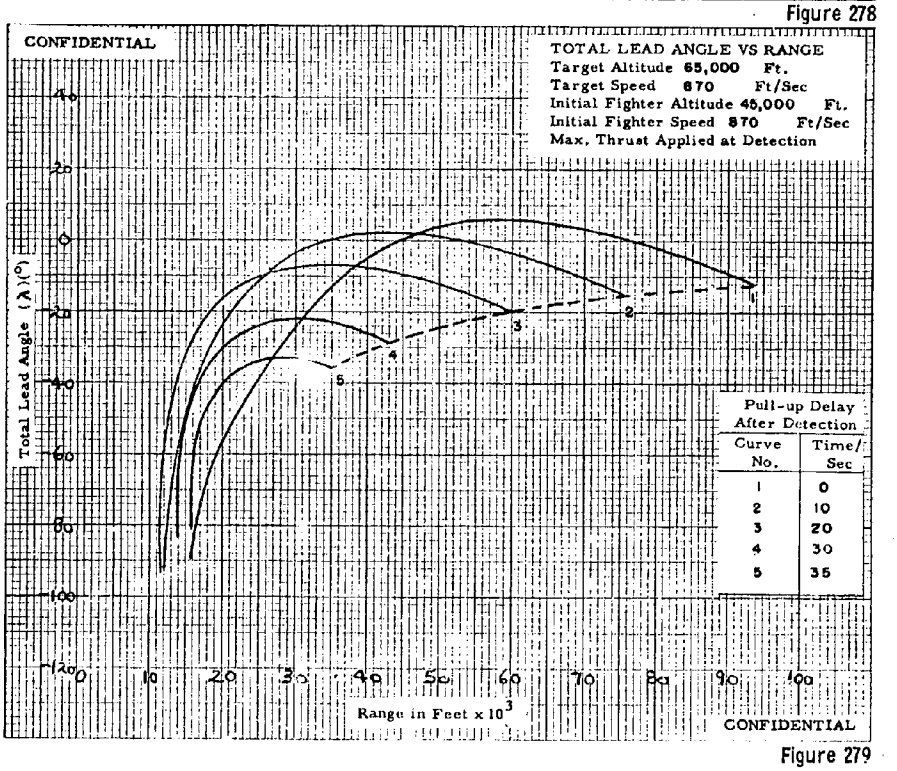
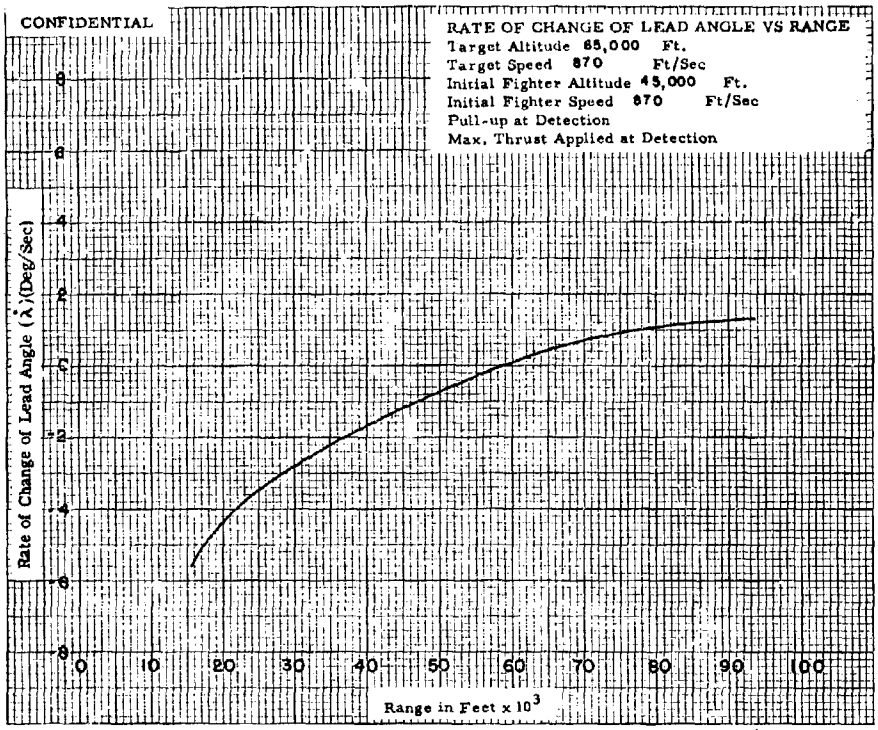


Figure 279


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
8
6
4
2
0
-2
-4
-6
-8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

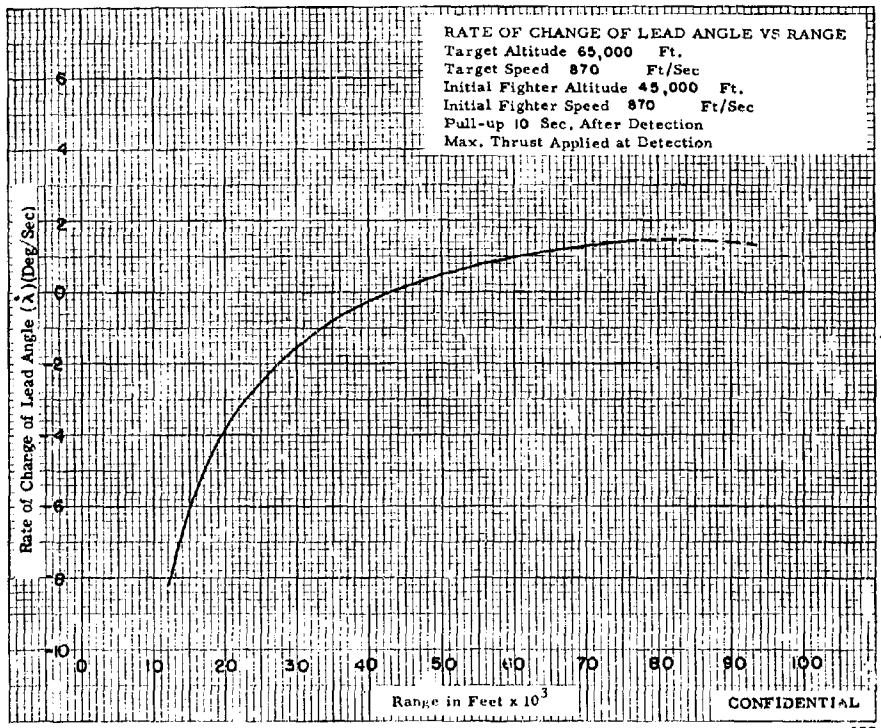
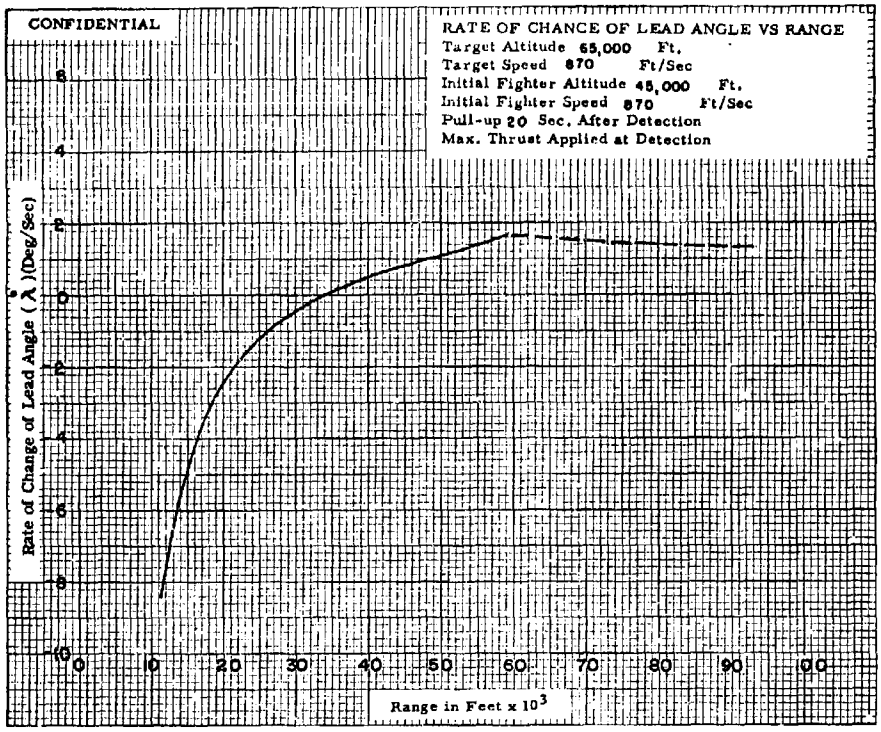

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
6
4
2
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 280


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
8
4
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

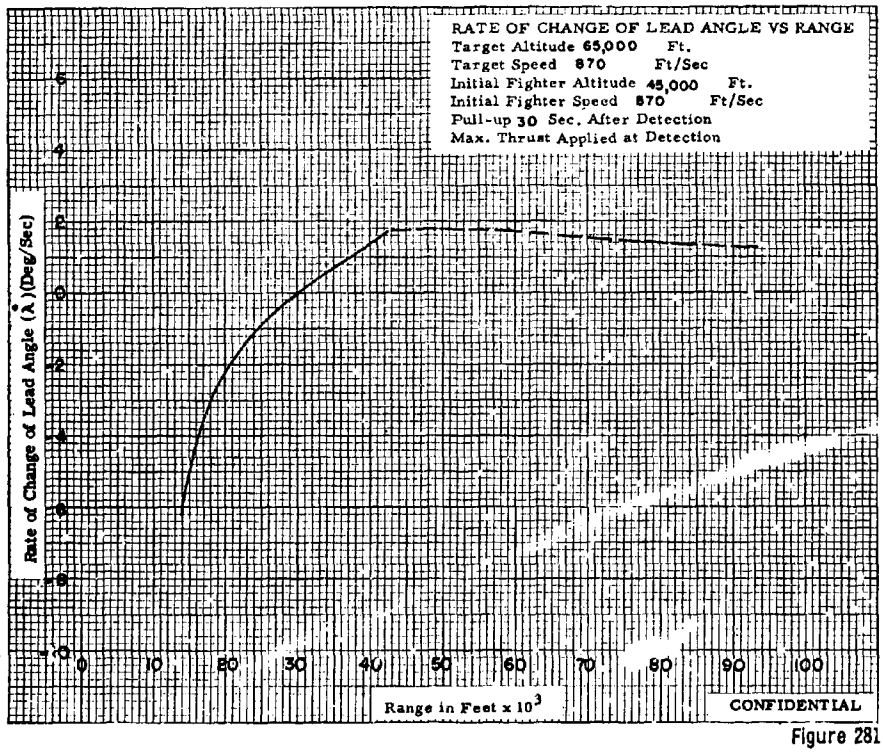

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
5
4
2
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 281

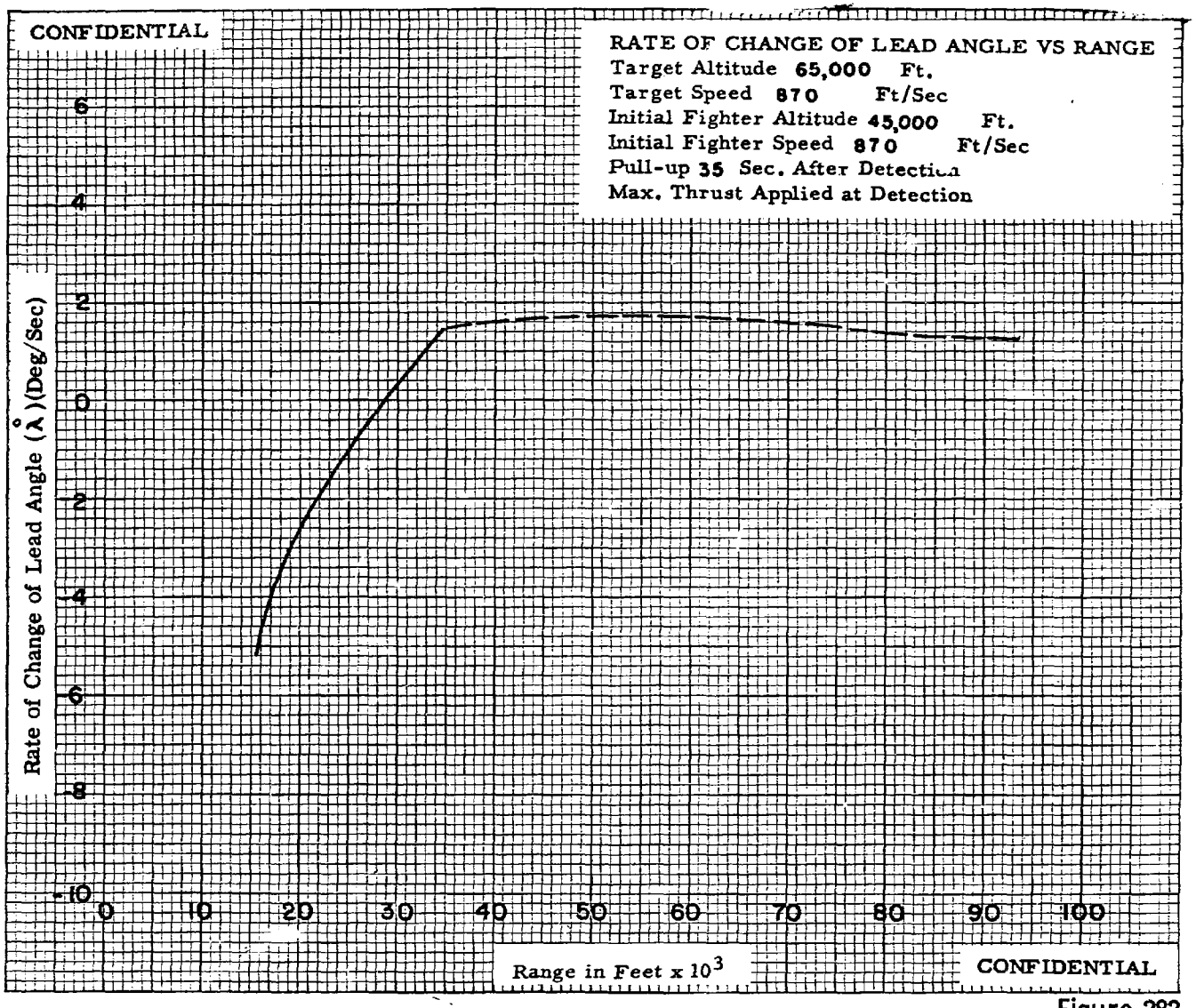
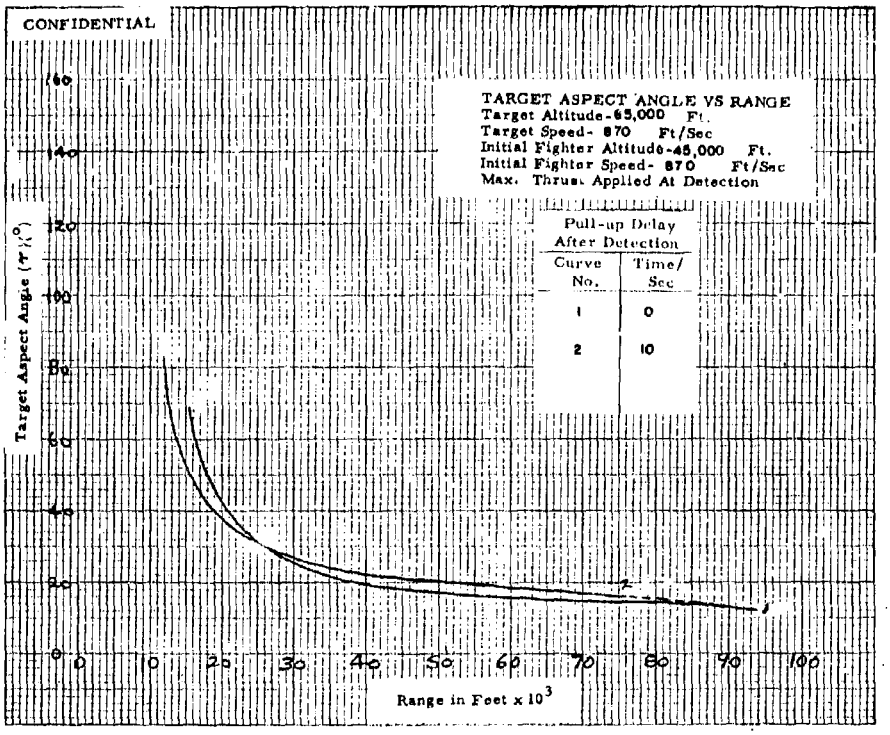
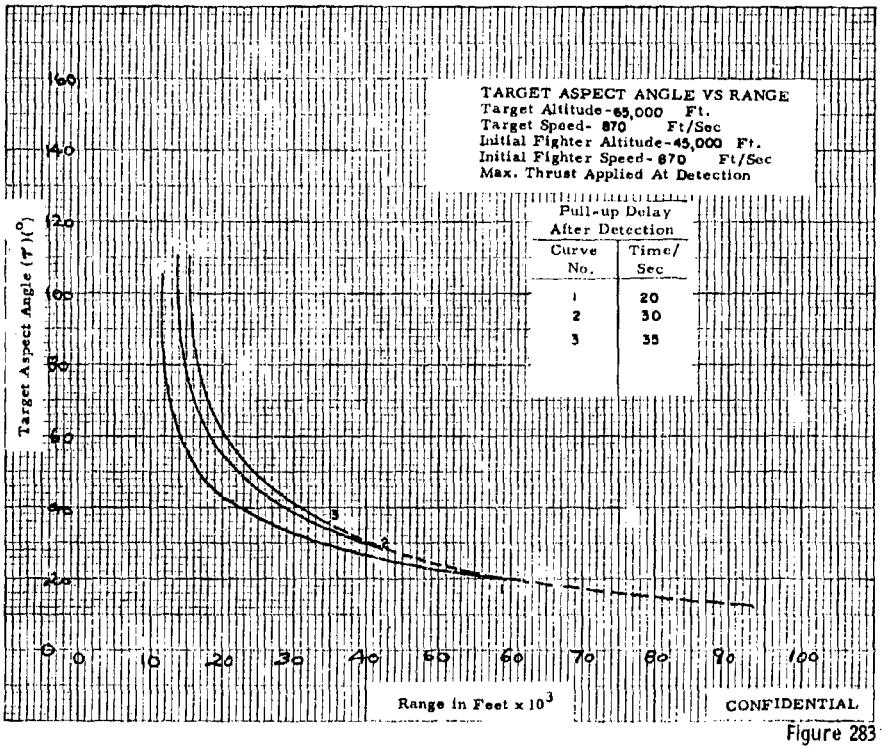

CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 45,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
6
4
2
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 282

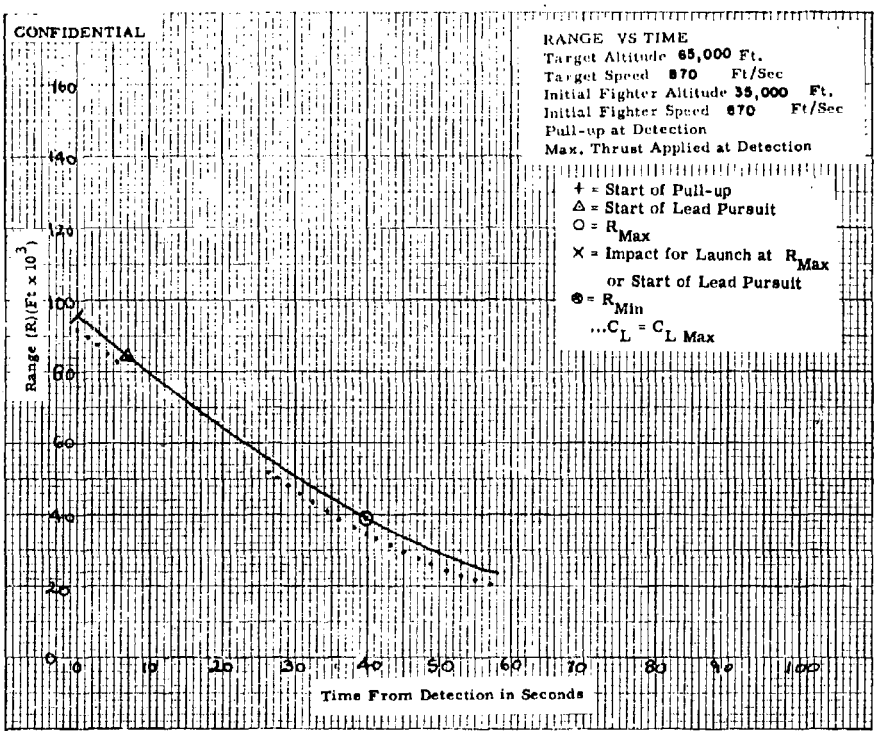
CONFIDENTIAL





CONFIDENTIAL

Figure 283


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Time From Detection in Seconds

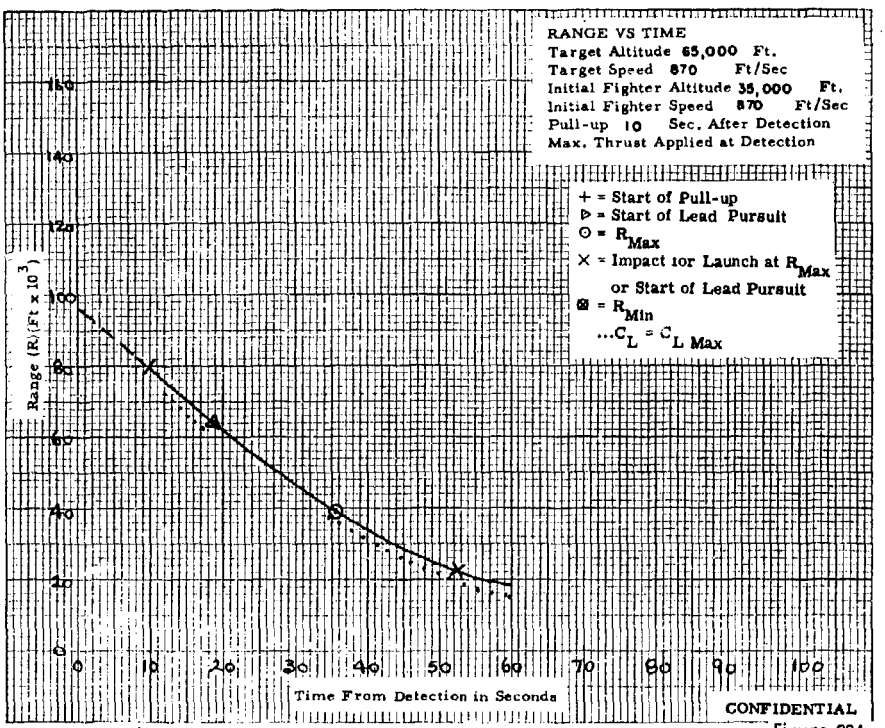
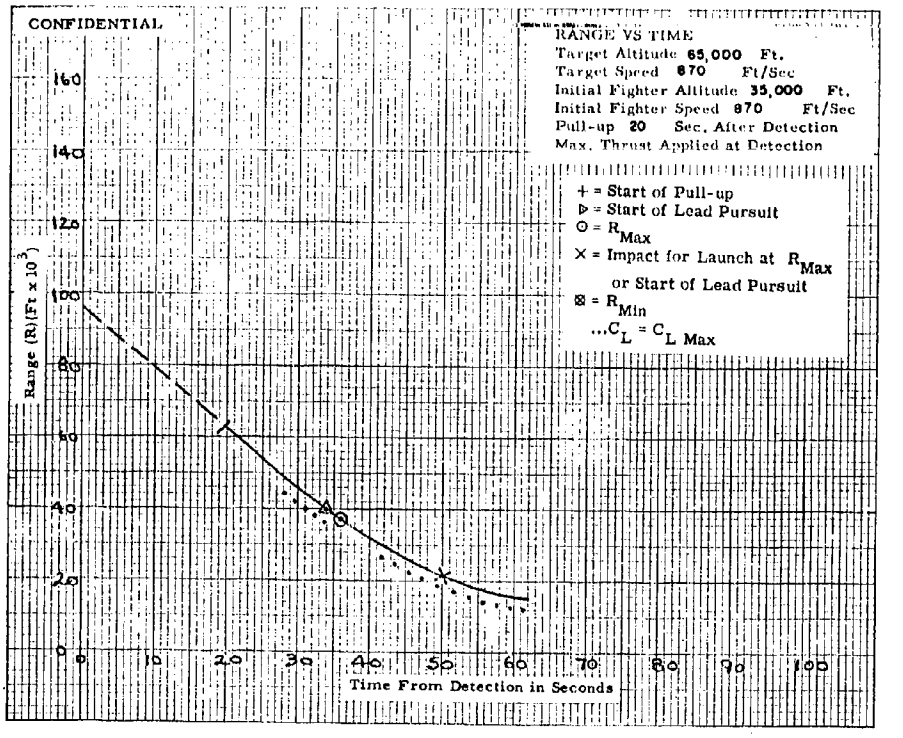

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Time From Detection in Seconds
CONFIDENTIAL

Figure 284


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0 0
10
20
30
40
50
60
70
80
90
100
Time From Detection in Seconds

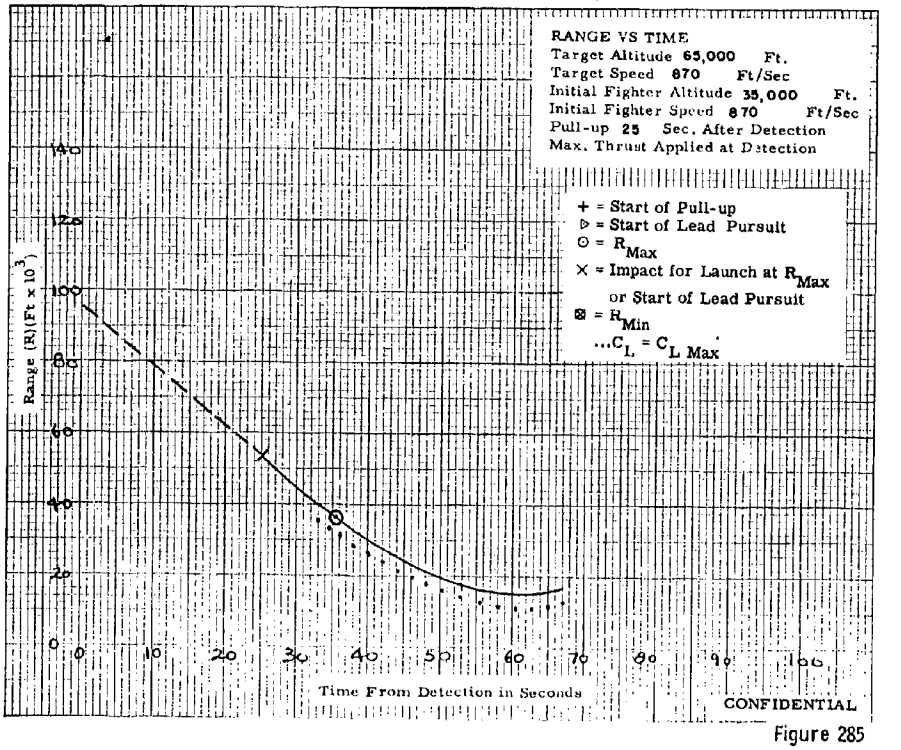

RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
140
120
100
80
60
40
20
0 0
10
20
30
40
50
60
70
80
90
100
Time From Detection in Seconds
CONFIDENTIAL

Figure 285

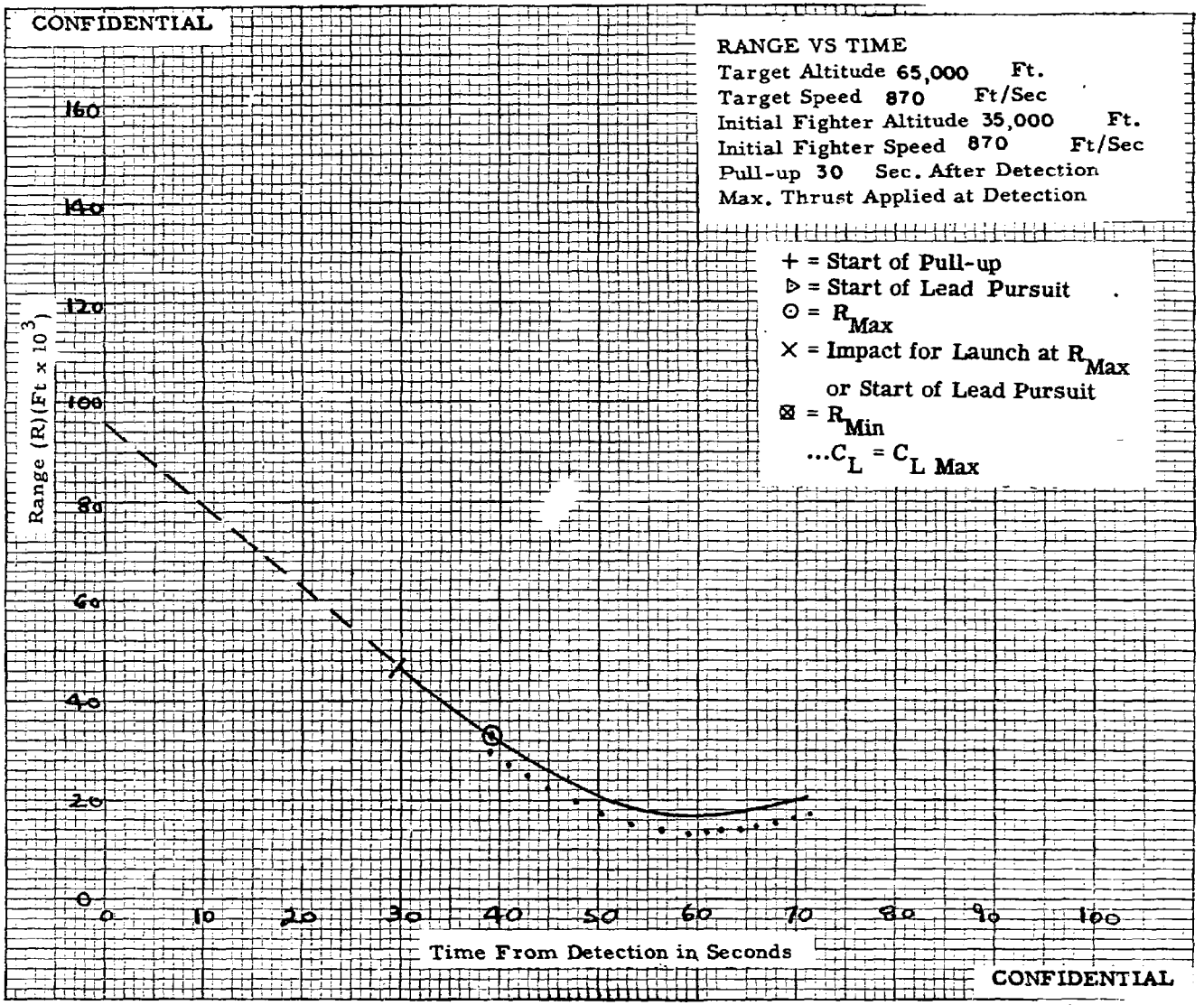
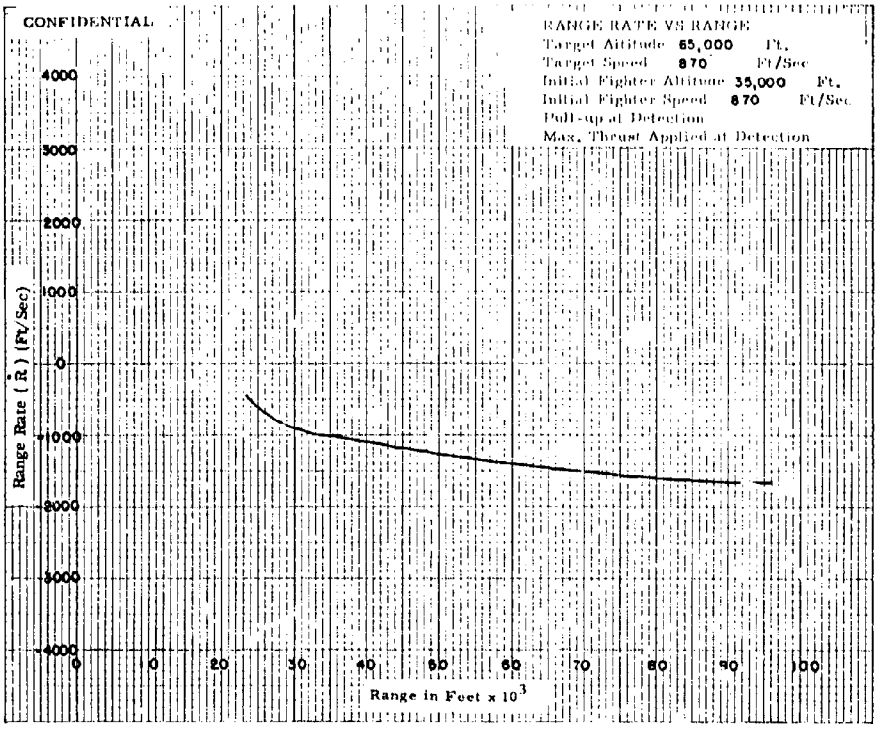

CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Time From Detection in Seconds
CONFIDENTIAL

Figure 286


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

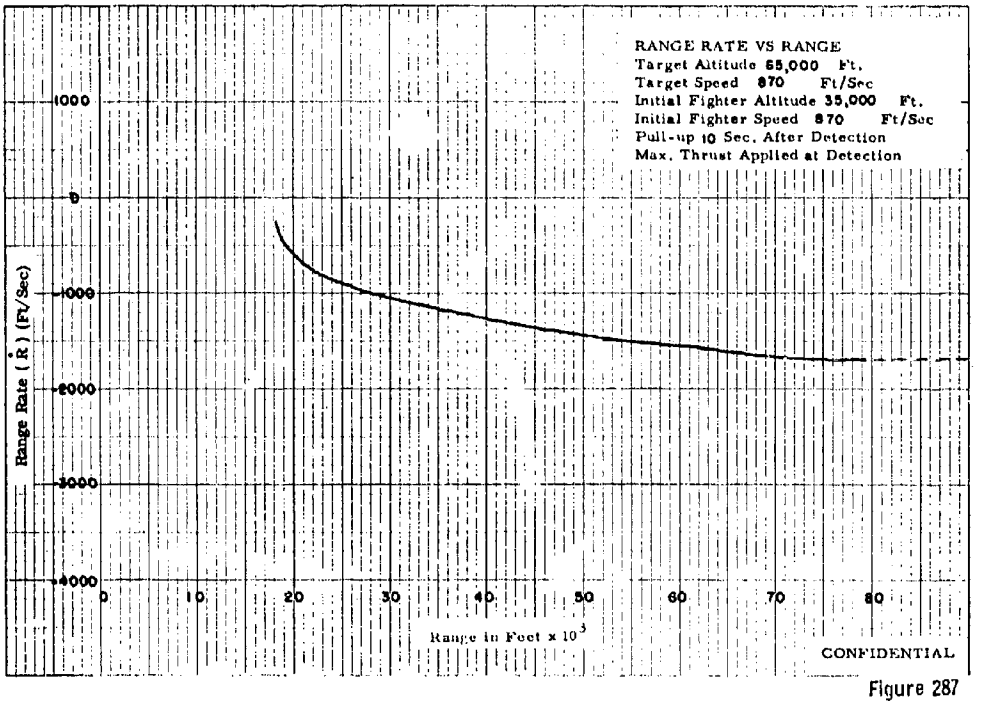
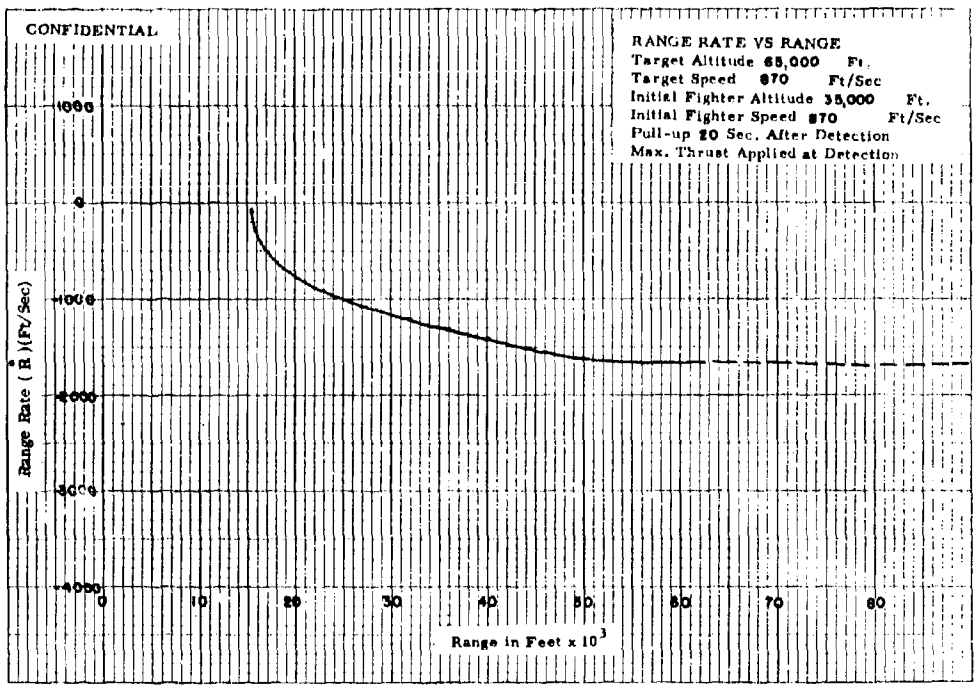

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 287


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-4000
-5000
-4050
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

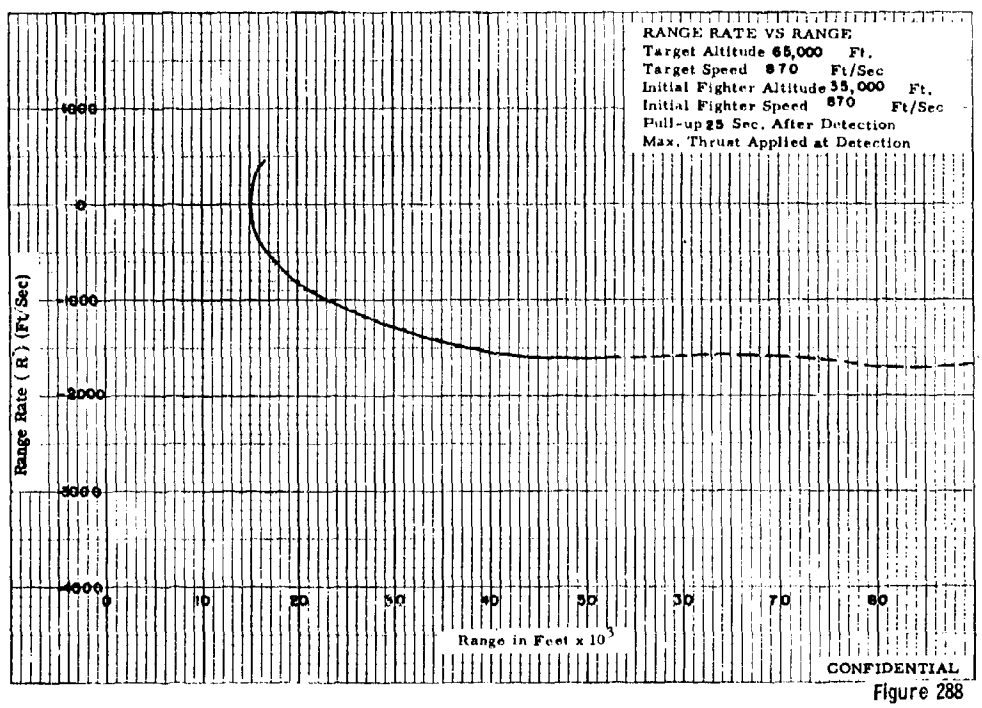

RANGE RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 288

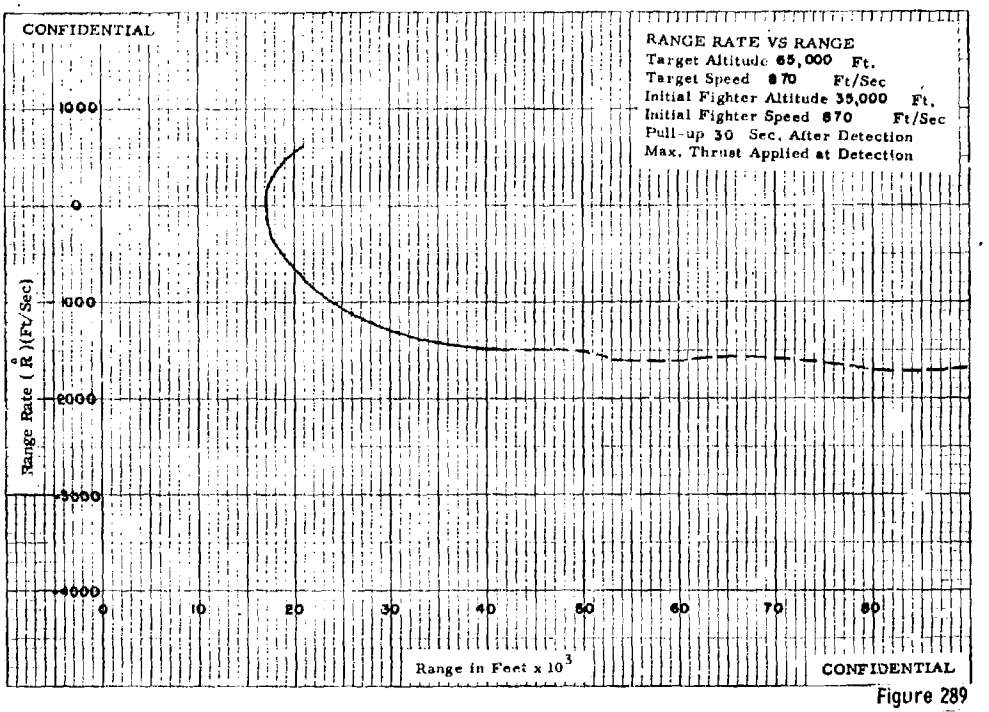


Figure 289

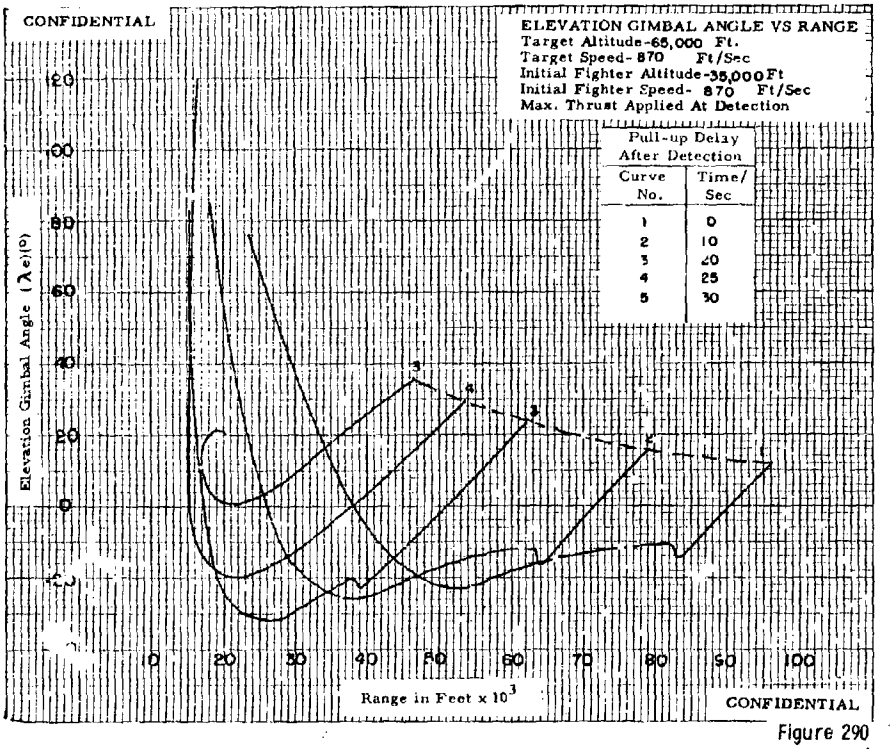
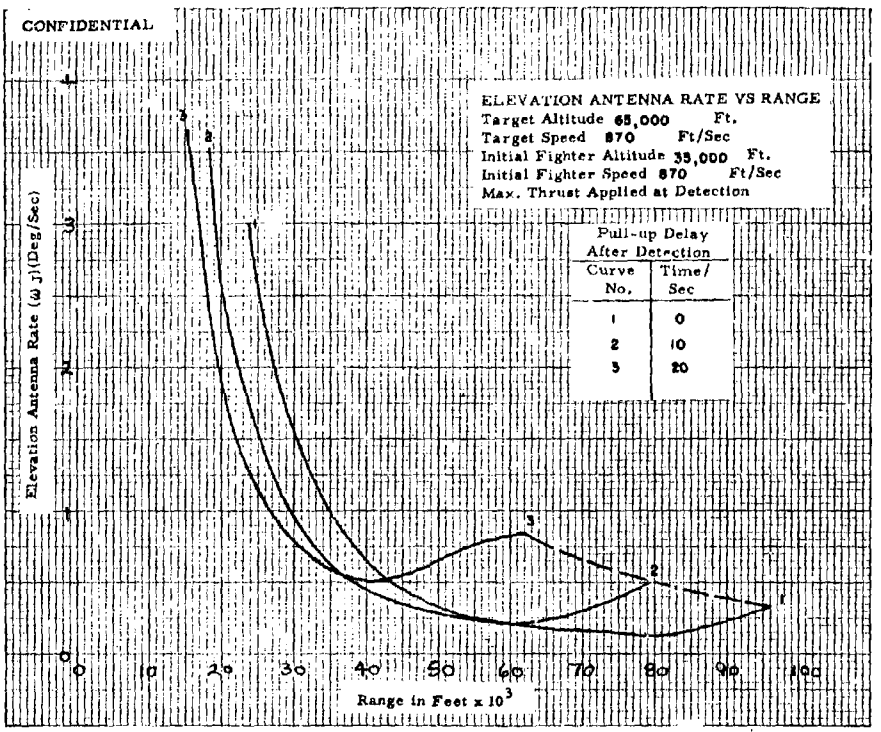


Figure 290


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 20
Elevation Antenna Rate (ω E)(Deg/Sec)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90 100

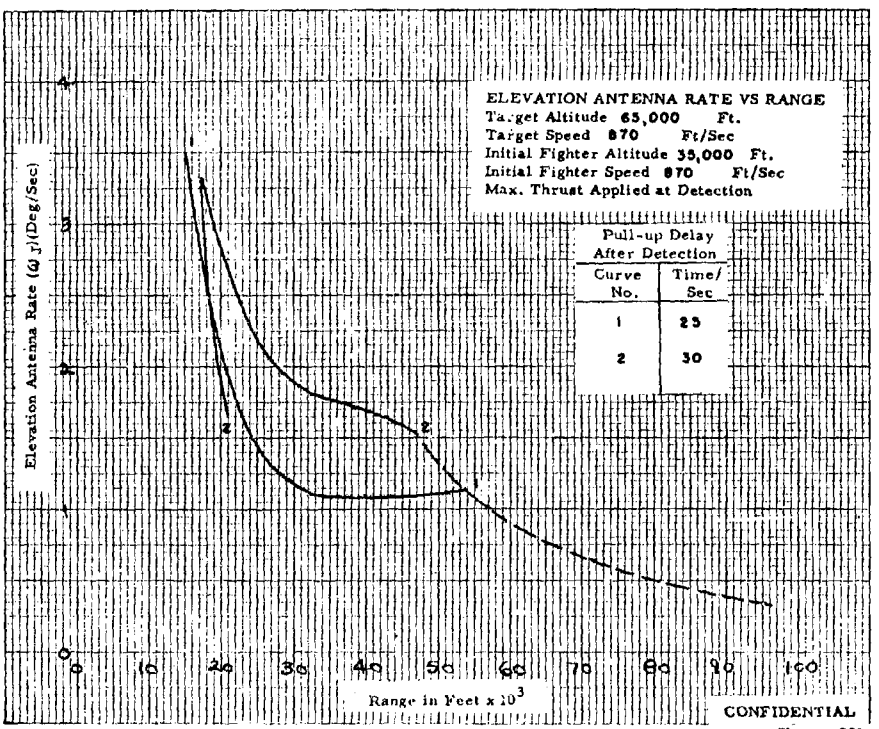
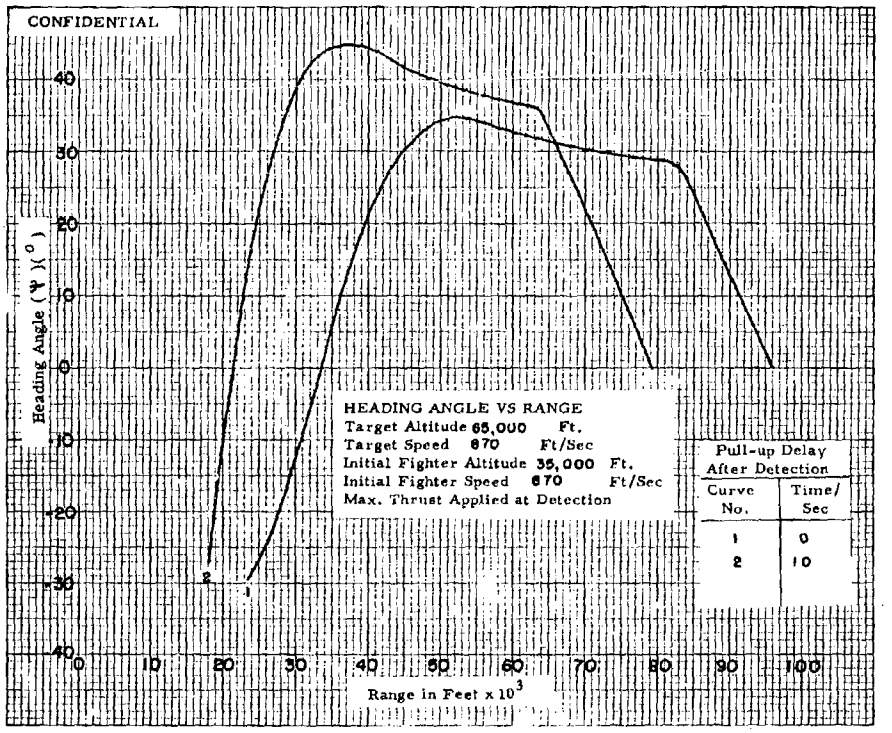

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 25
2 | 30
Elevation Antenna Rate (ω E)(Deg/Sec)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90 100

Figure 291


HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
Heading Angle (Ψ)(°)
Range in Feet x 10³

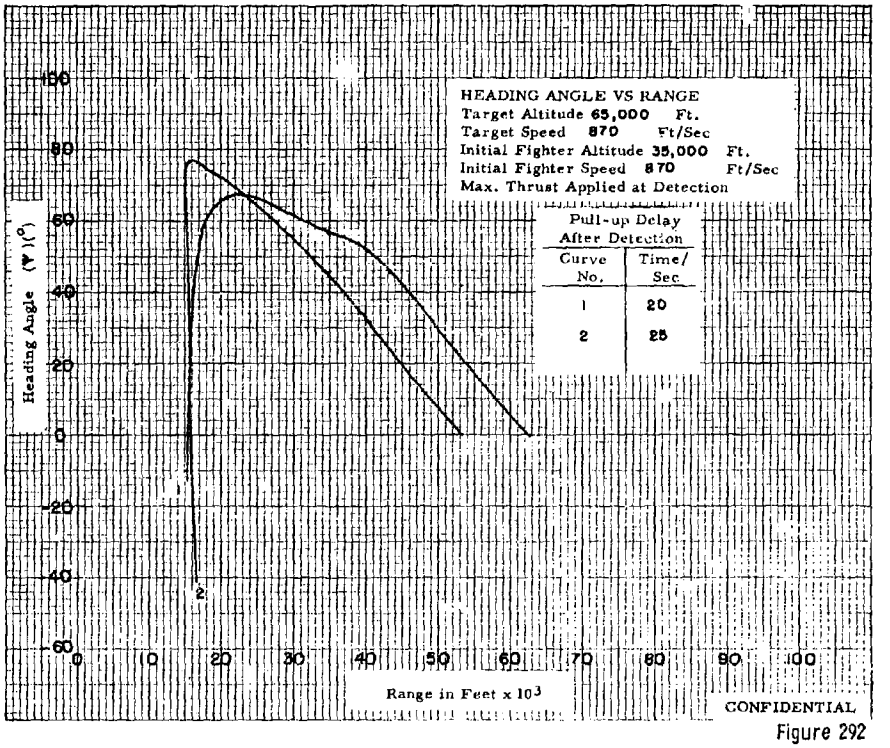

HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 20
2 | 25
Heading Angle (Ψ)(°)
Range in Feet x 10³

Figure 292

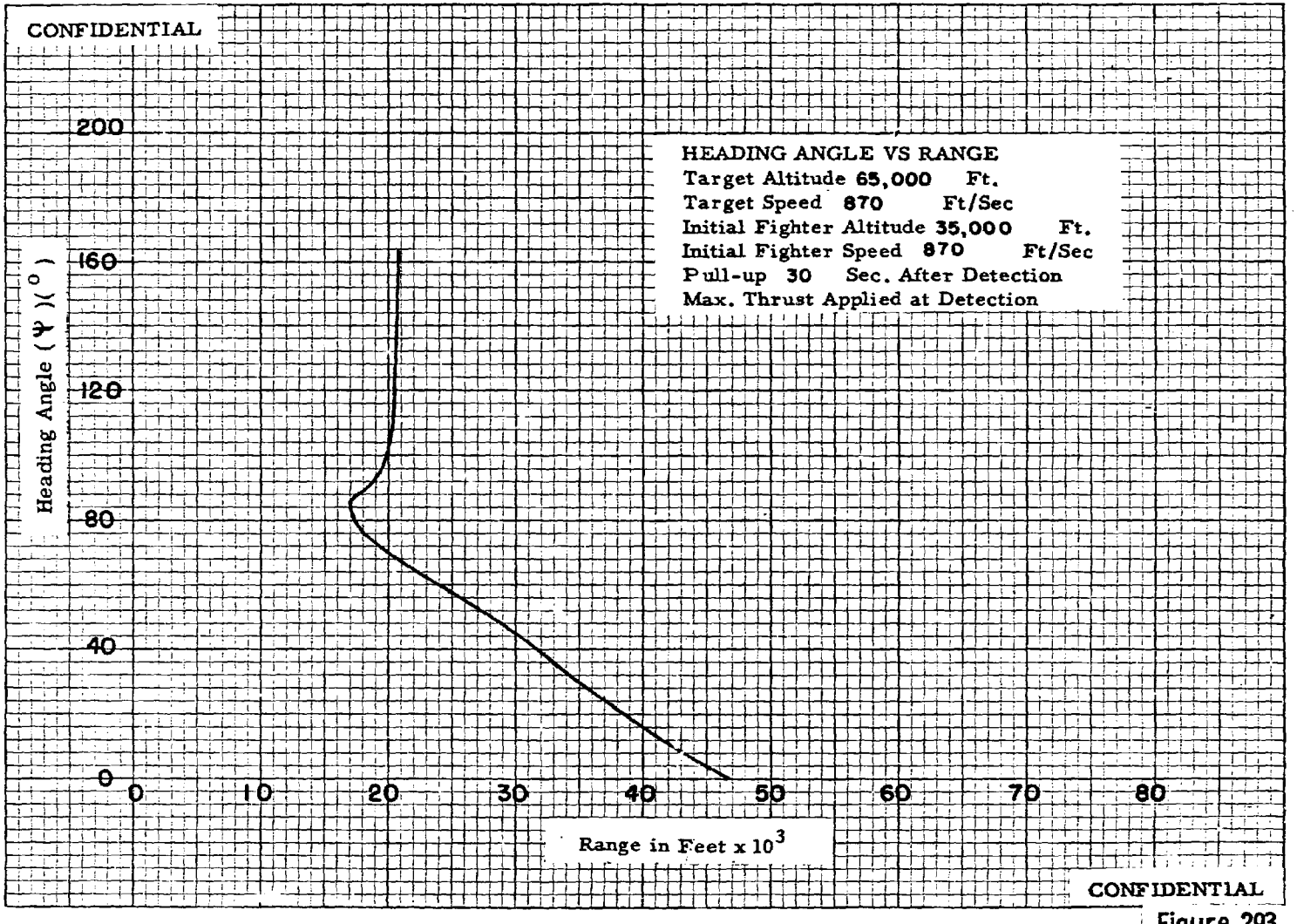
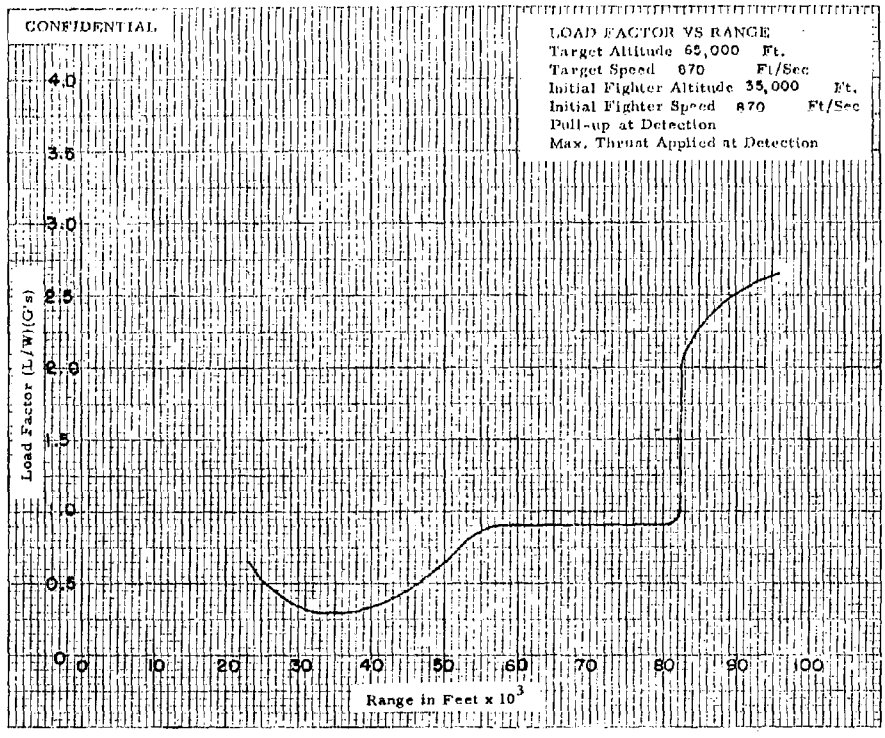

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Heading Angle (Ψ)(°)
200
160
120
80
40
0
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 293


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

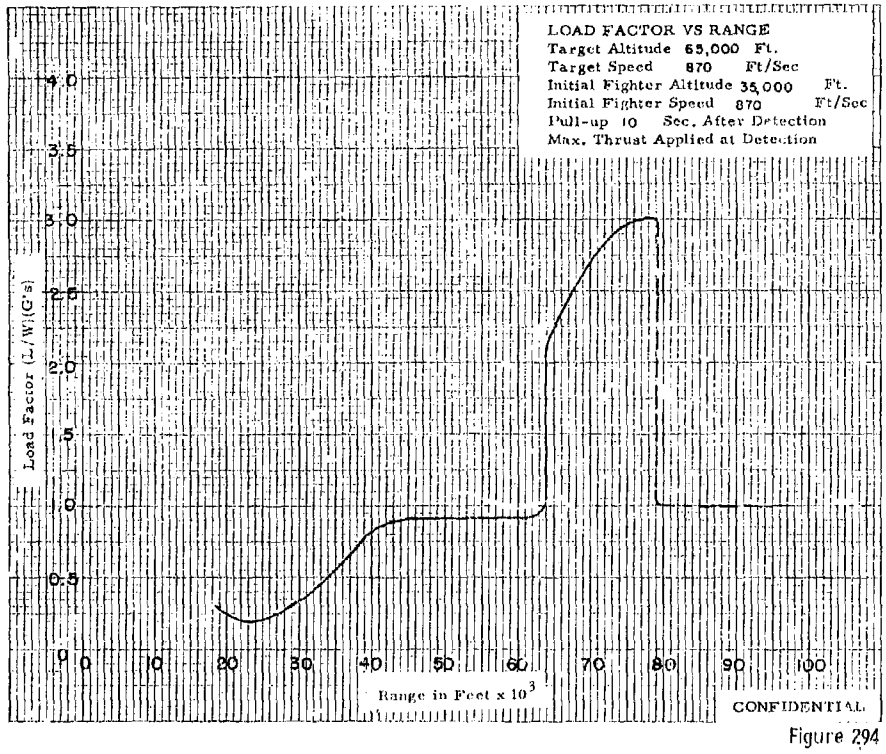
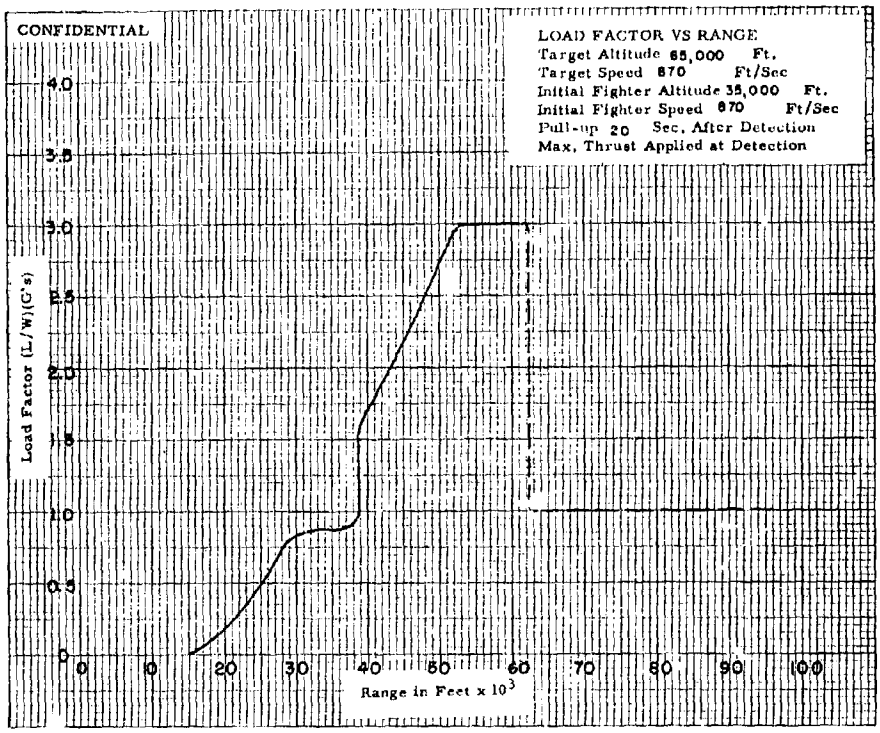

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 294


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

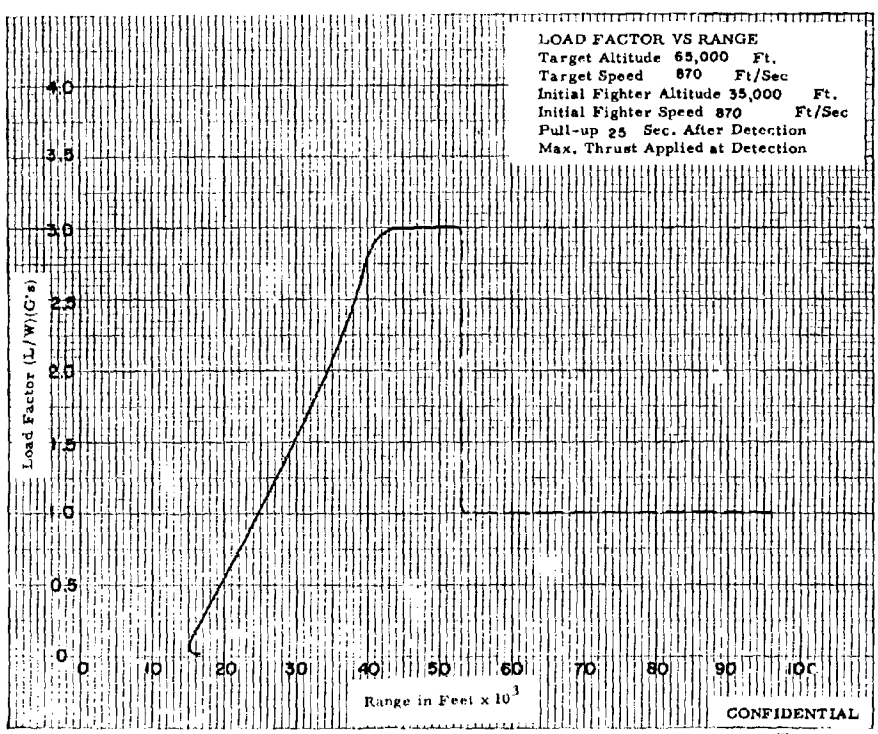

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 295

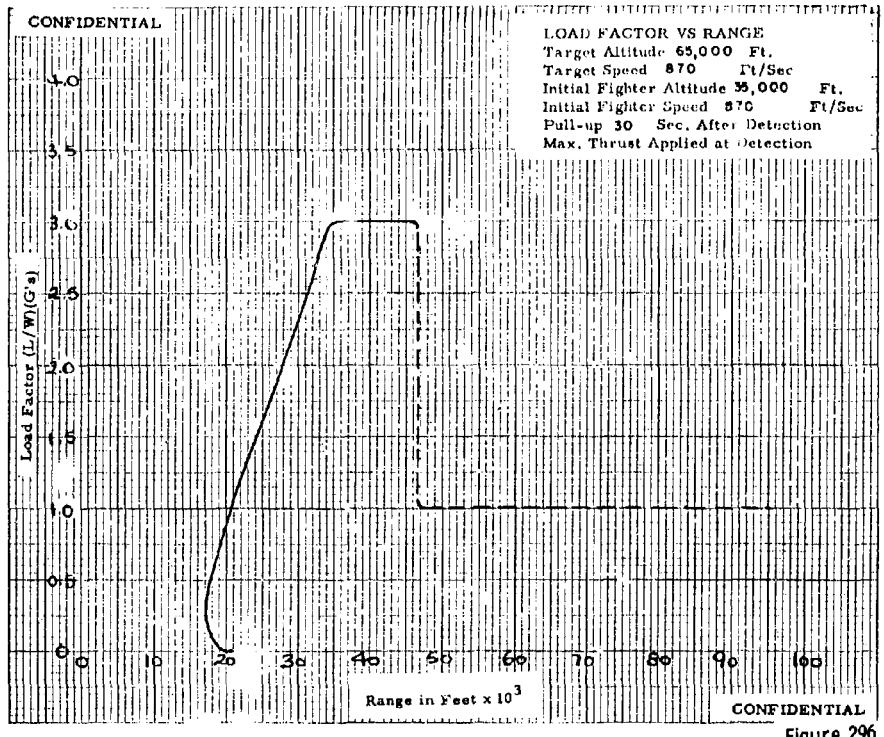


Figure 296

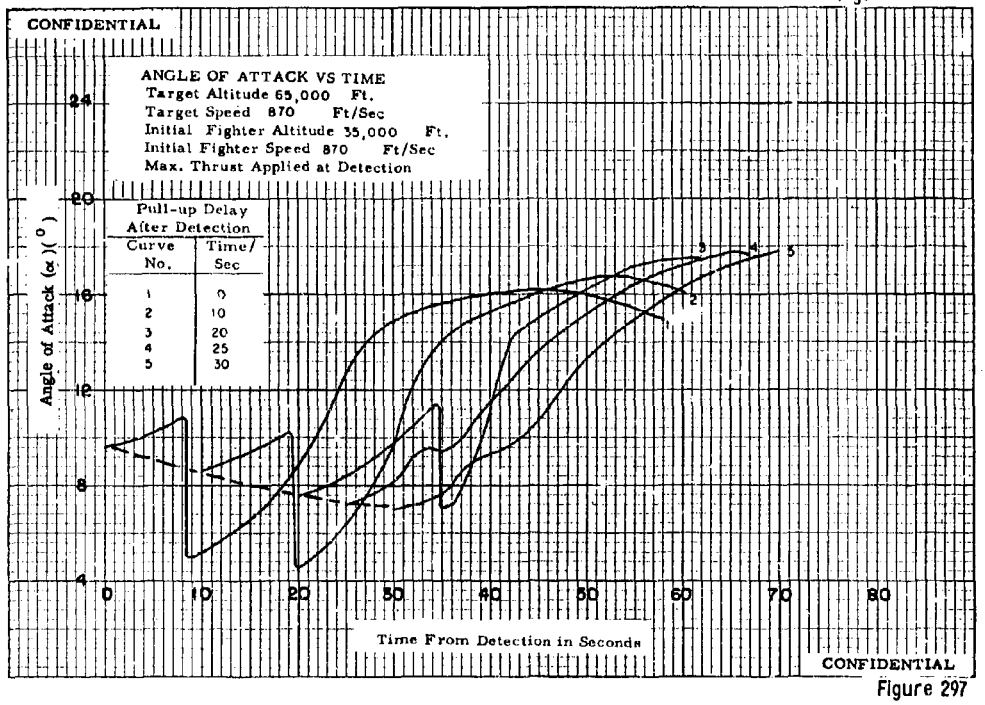


Figure 297

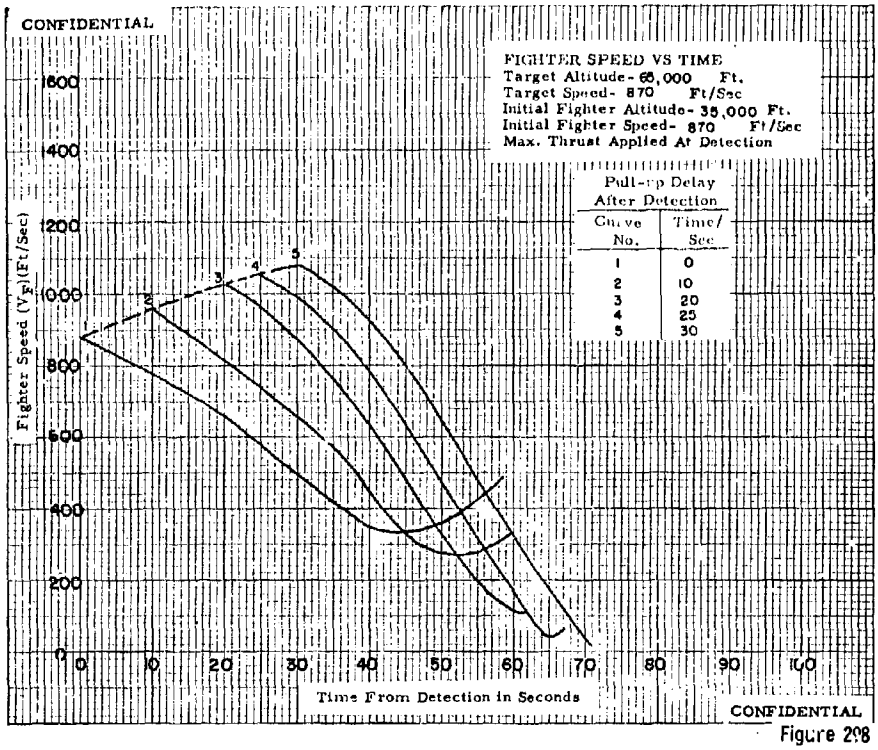


Figure 298

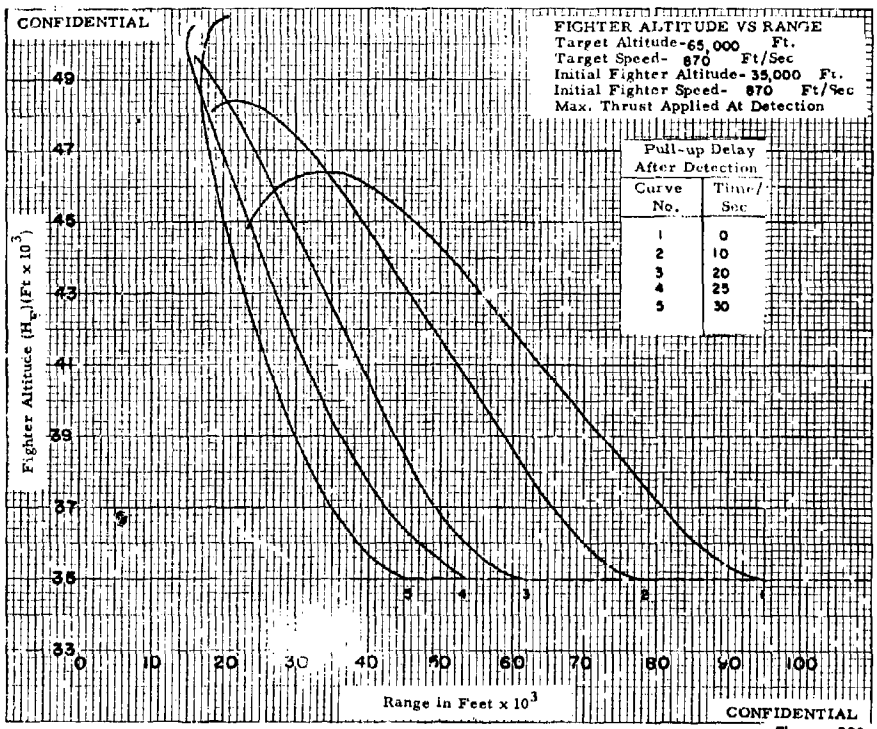
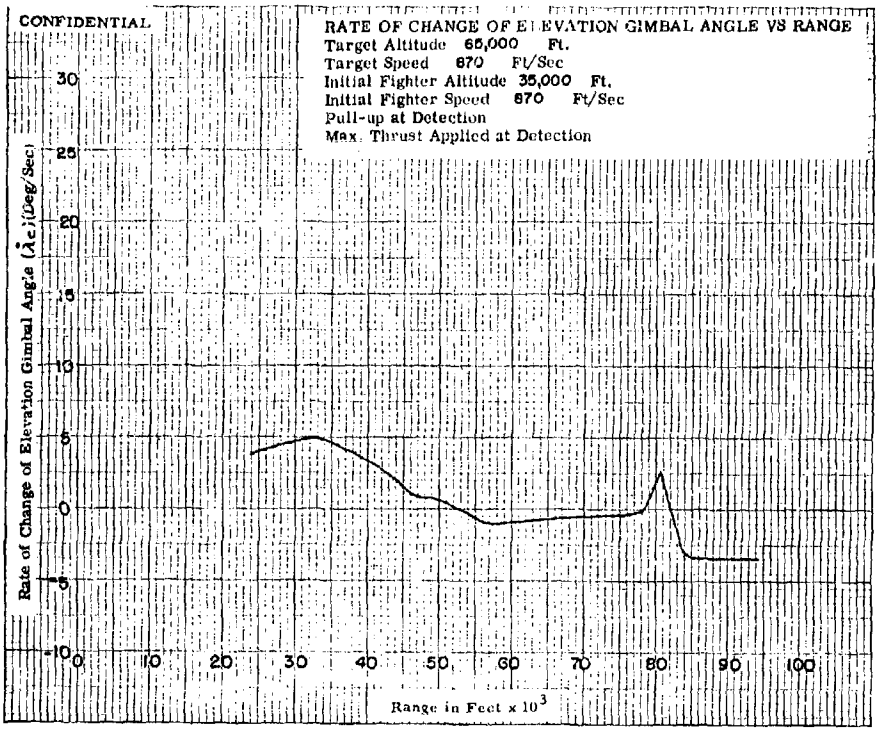


Figure 299


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

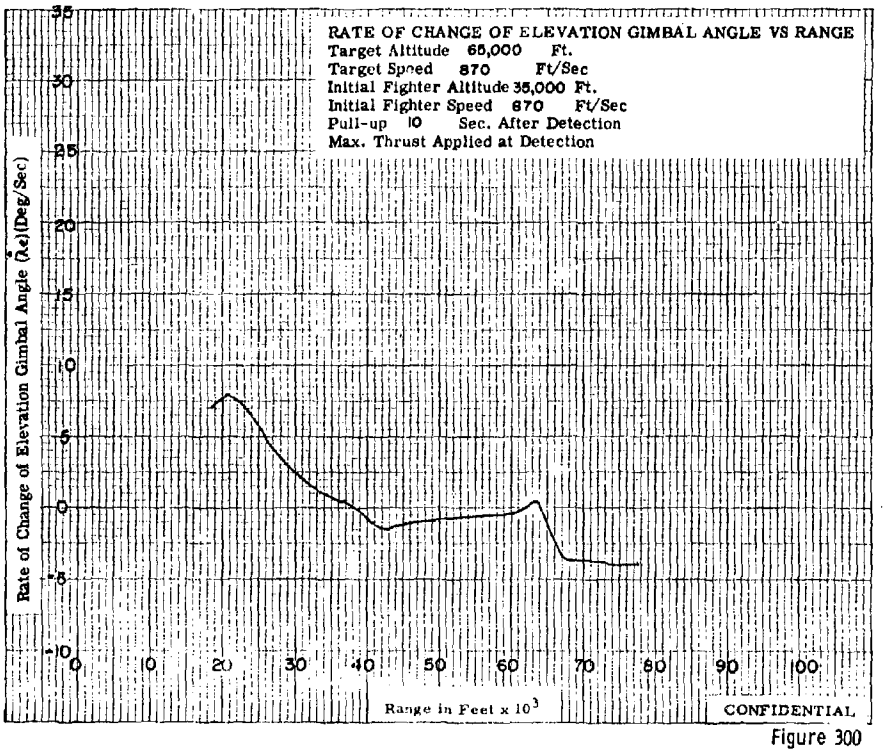
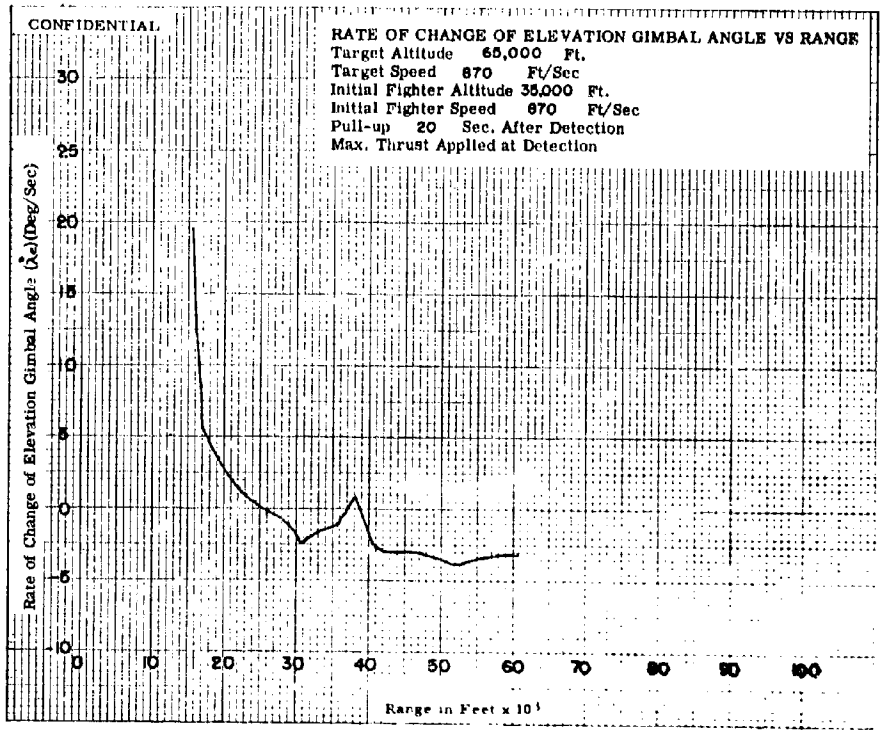

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
35
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 300


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

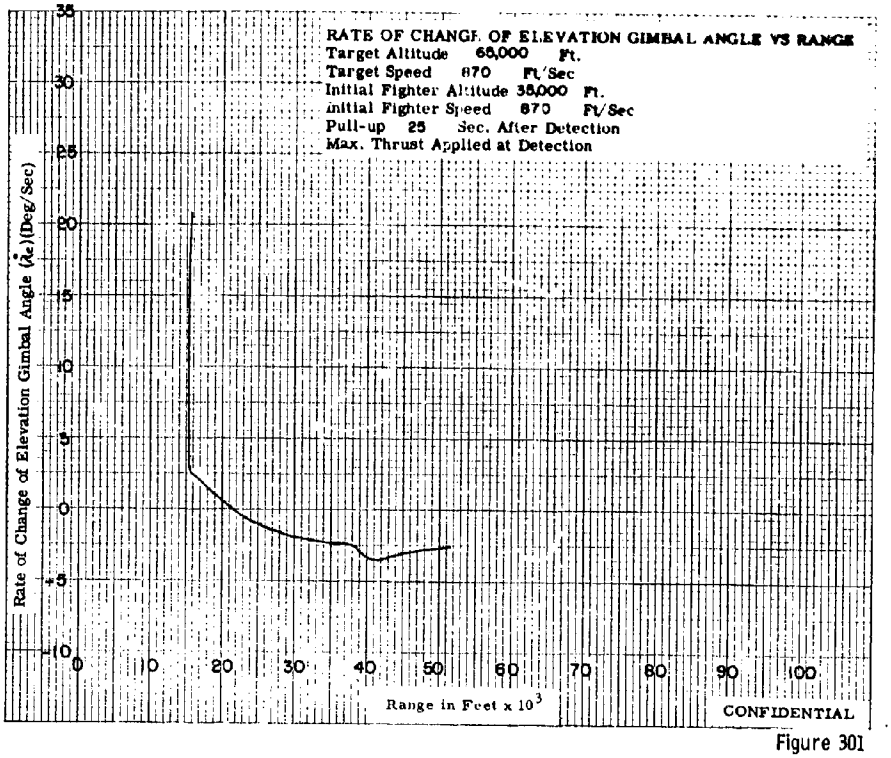

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
35
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 301

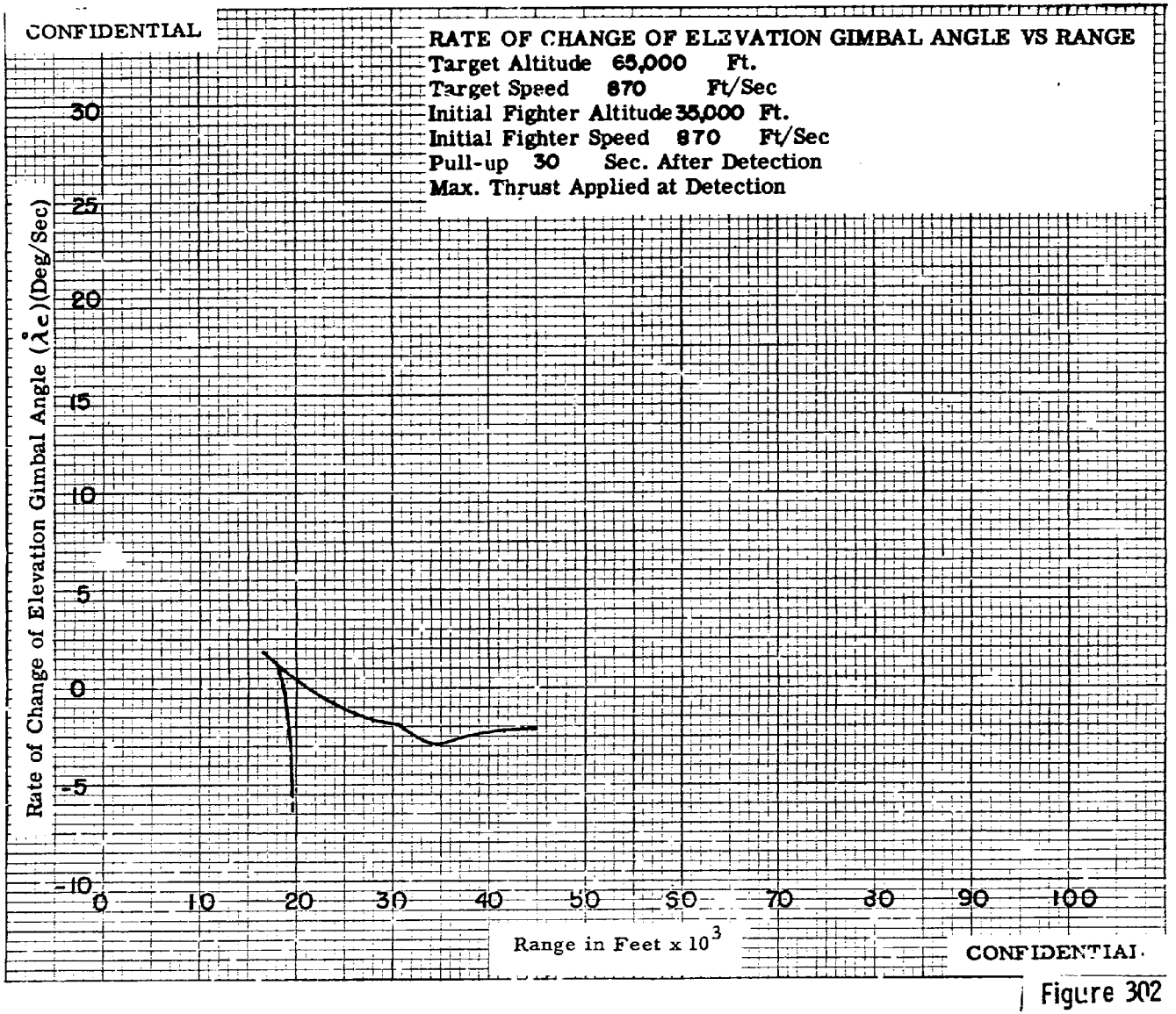
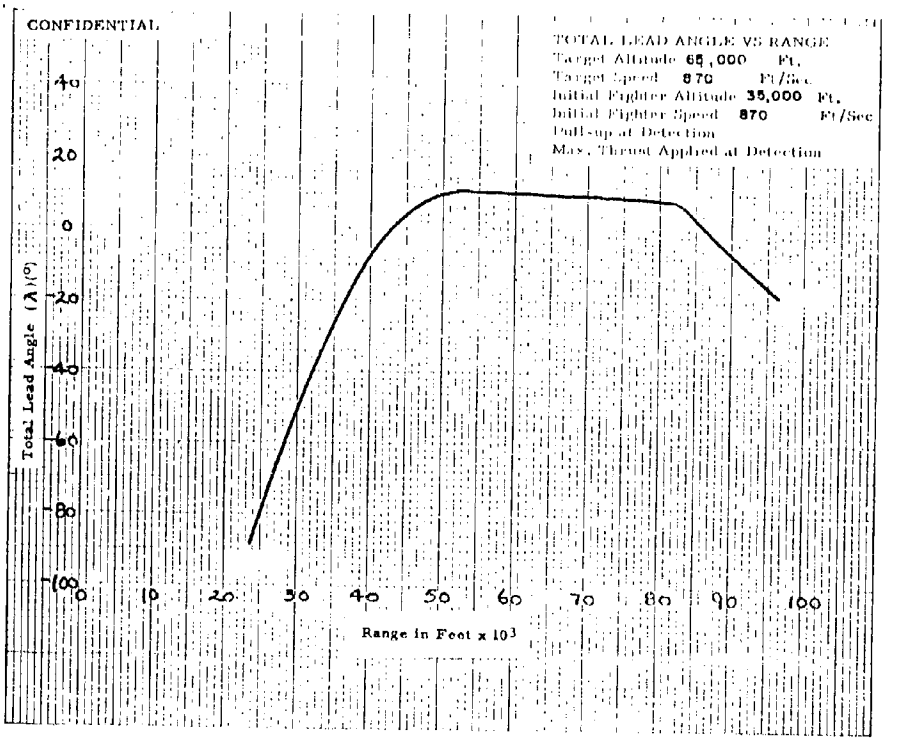

CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 302


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
40
20
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

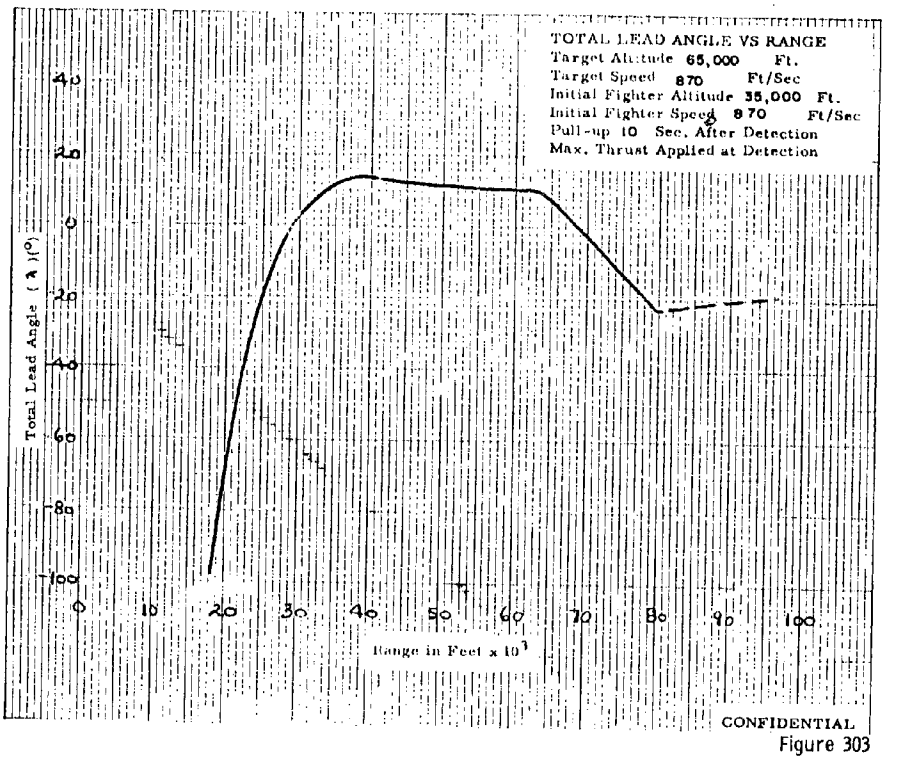
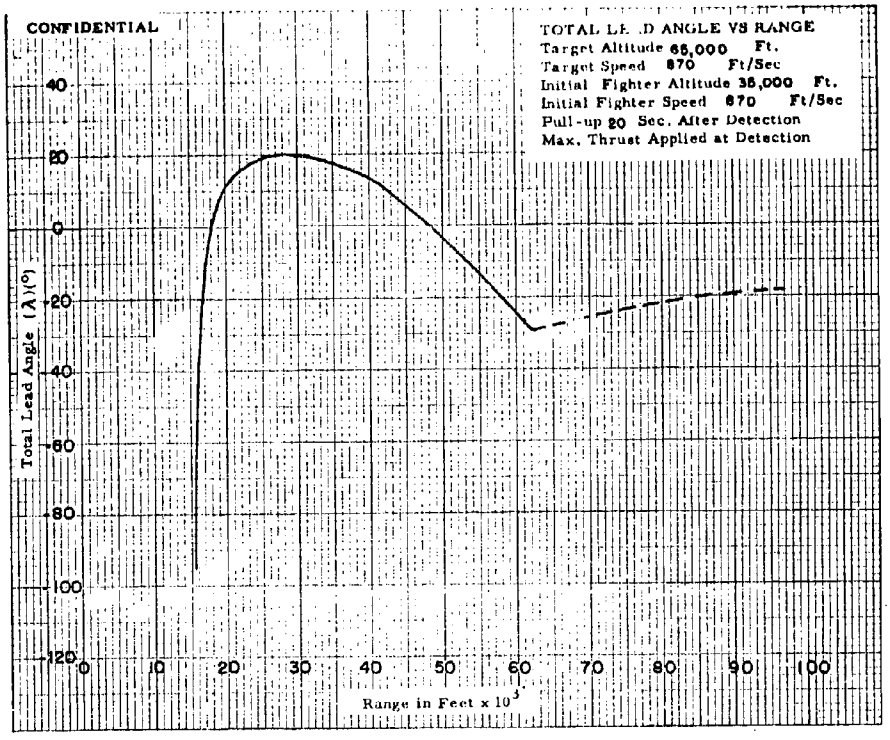

TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
40
20
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 303


CONFIDENTIAL
TOTAL LE .D ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
40
20
0
-20
-40
-60
-80
-100
-120
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

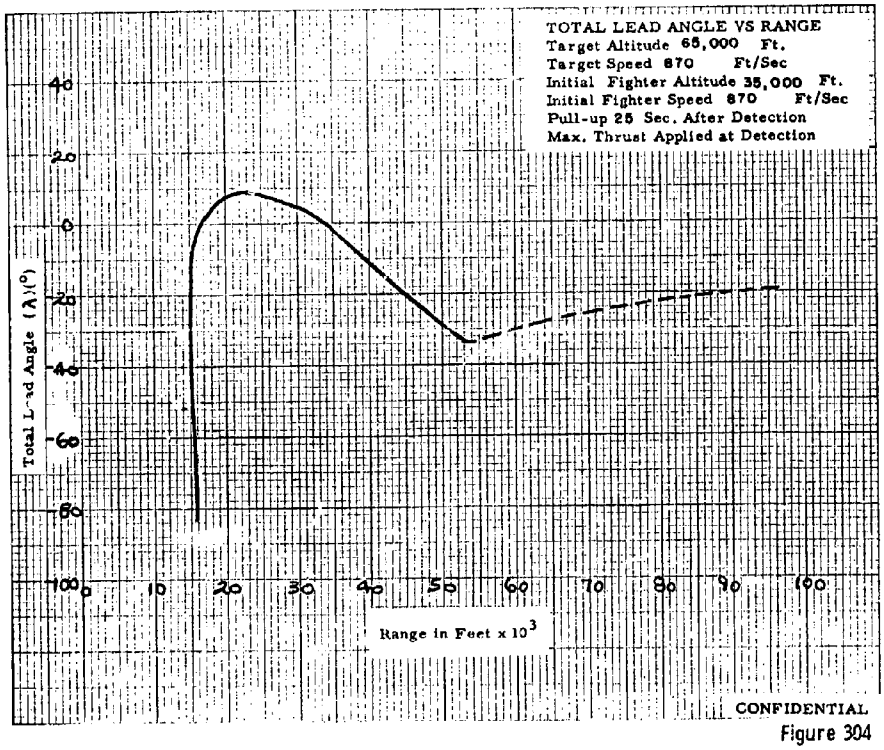

TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
40
20
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 304

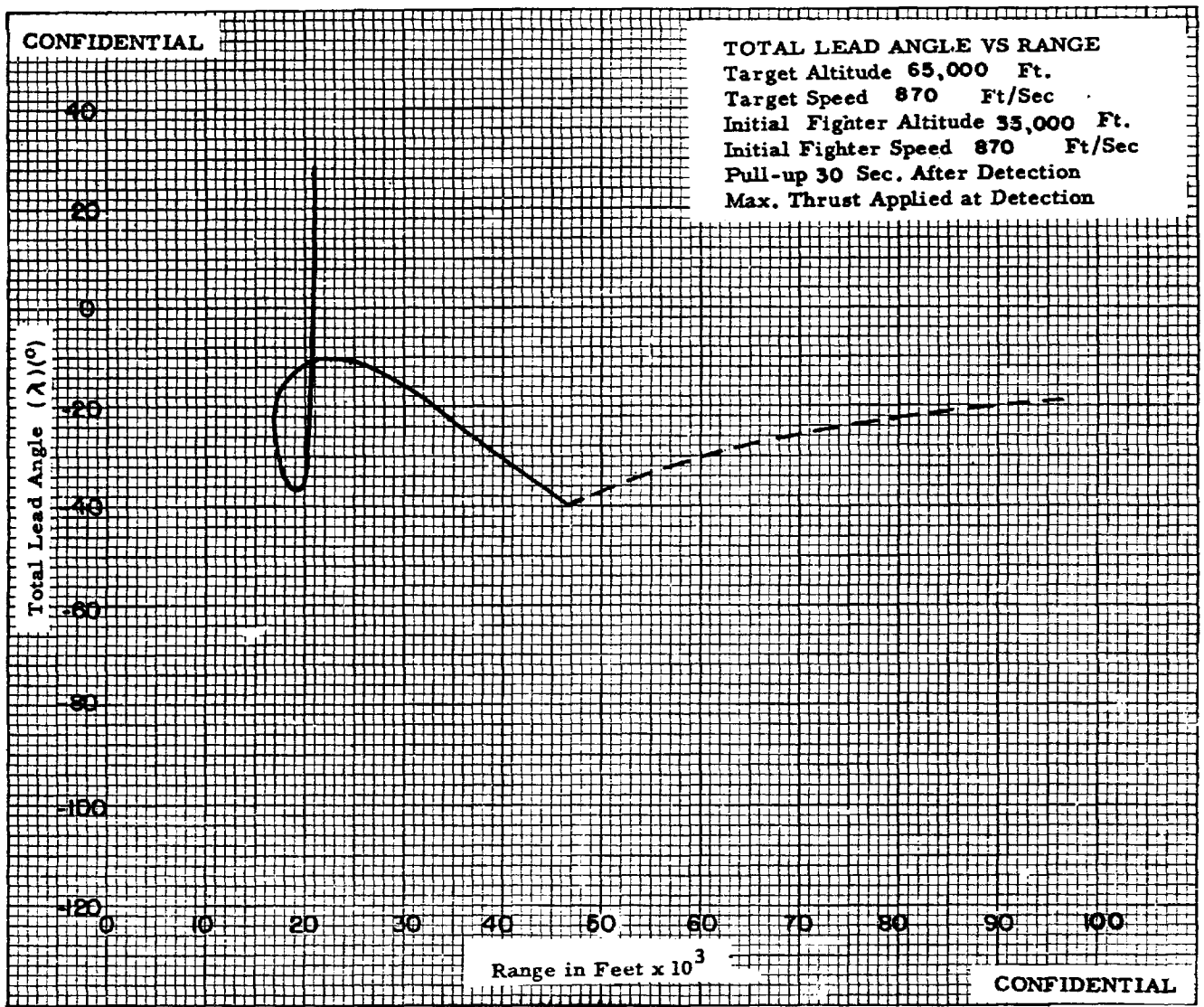
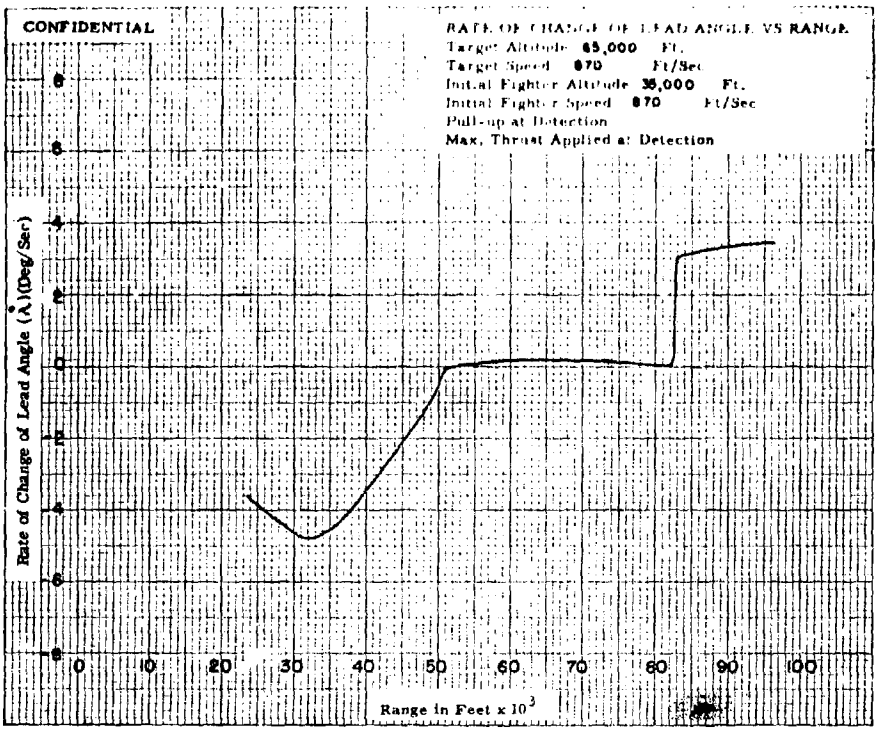

CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
40
20
0
-20
-40
-60
-80
-100
-120
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 305


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
Range in Feet x 10³

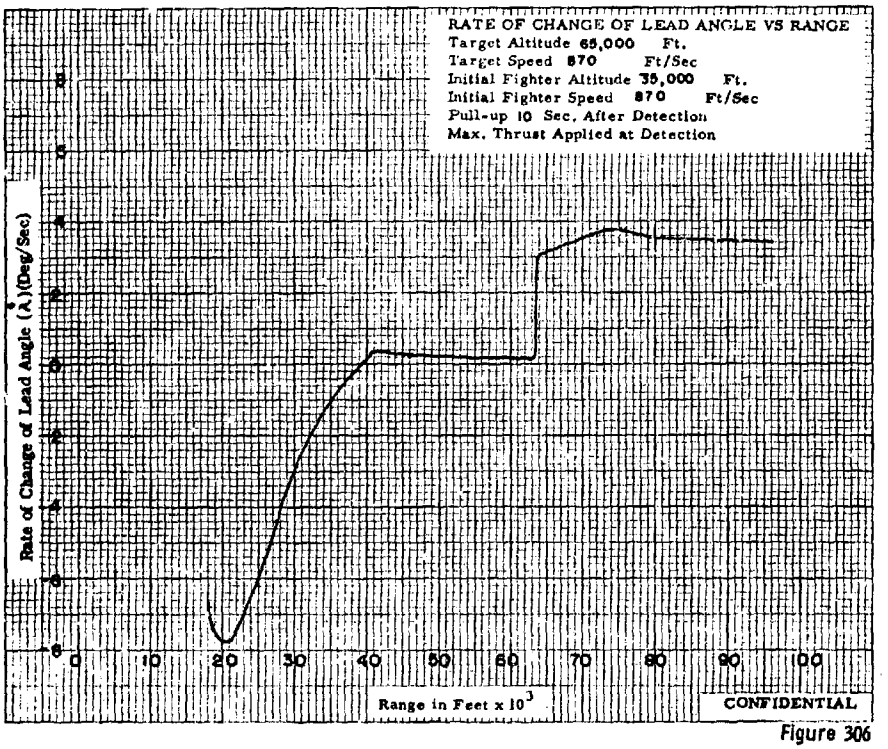
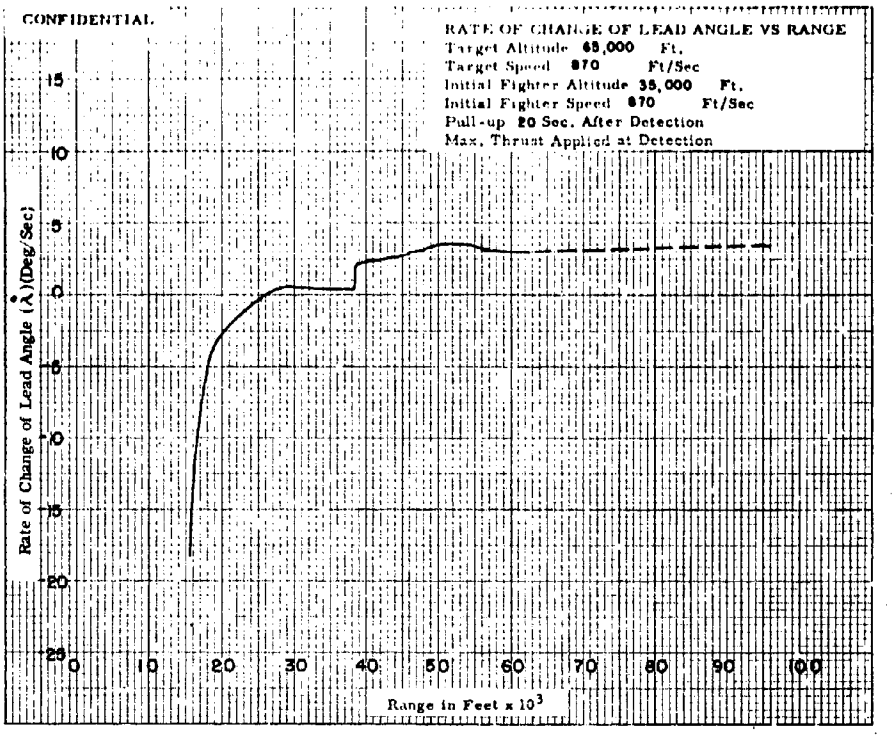
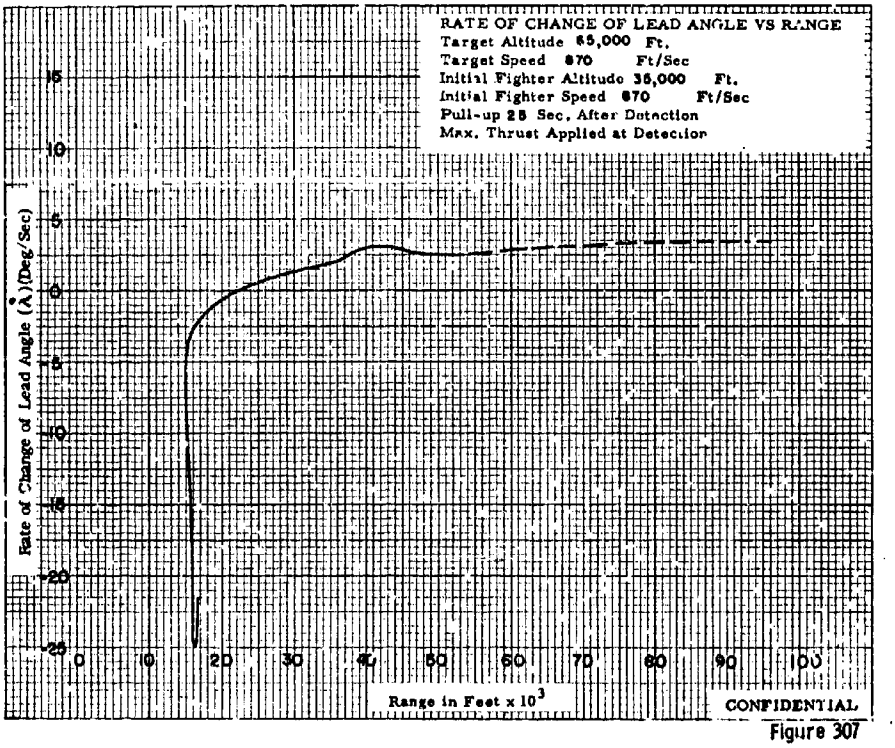

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
Range in Feet x 10³
CONFIDENTIAL

Figure 306

CONFIDENTIAL





CONFIDENTIAL

Figure 307

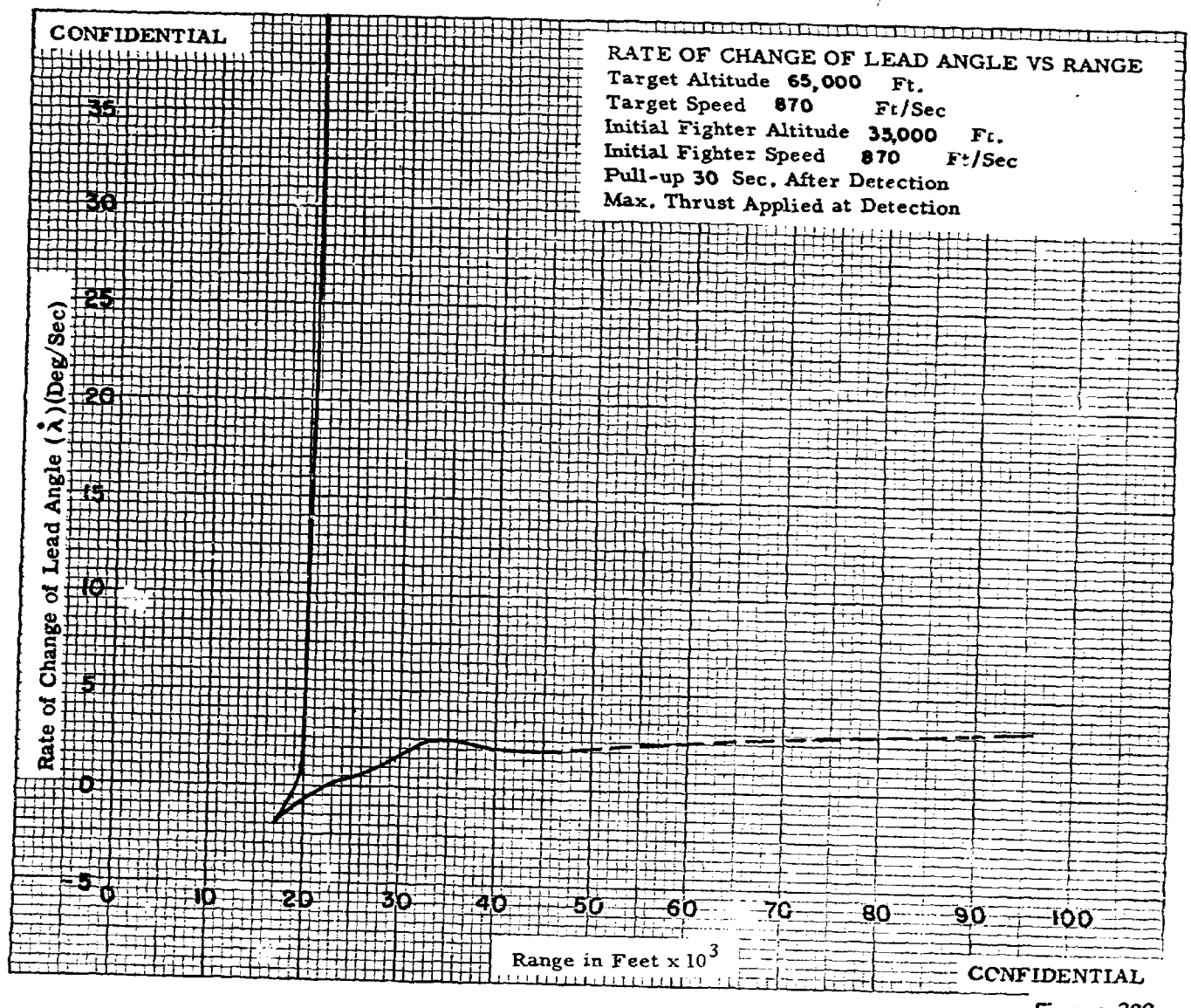
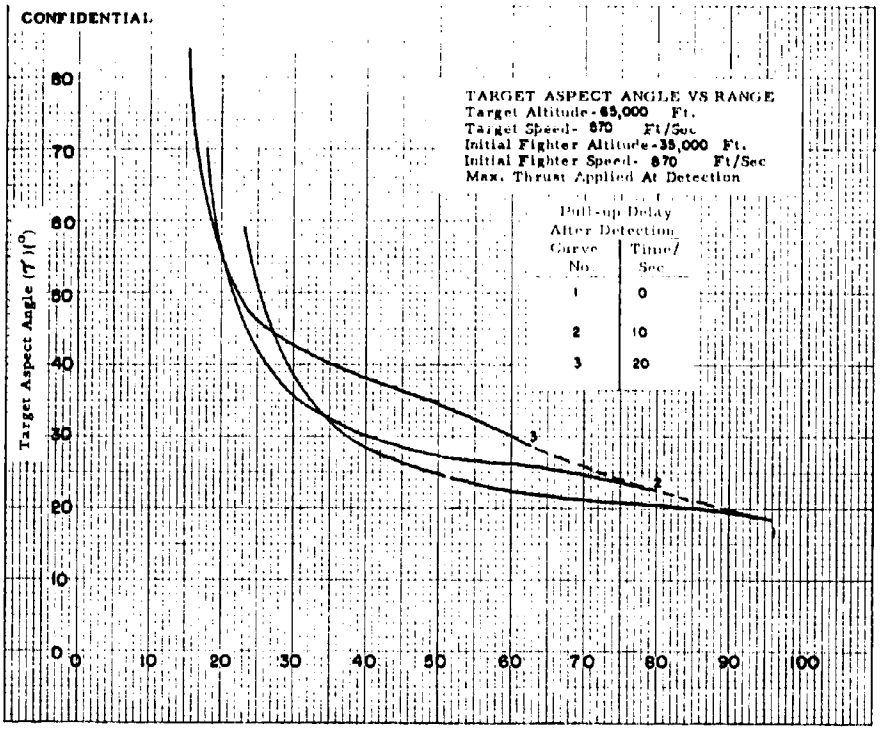

CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 870 Ft/Sec
Initial Fighter Altitude 35,000 Ft.
Initial Fighter Speed 870 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
35
30
25
20
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 308


TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 870 Ft/Sec
Initial Fighter Altitude-35,000 Ft.
Initial Fighter Speed- 870 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 20
Target Aspect Angle (Ψ)(°)
0 10 20 30 40 50 60 70 80 90 100

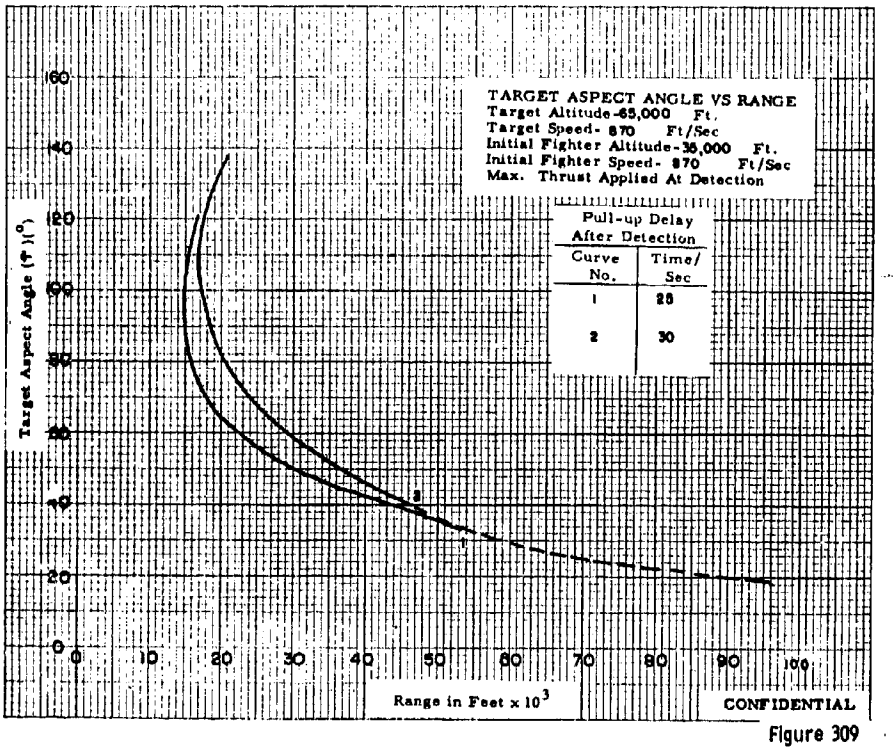
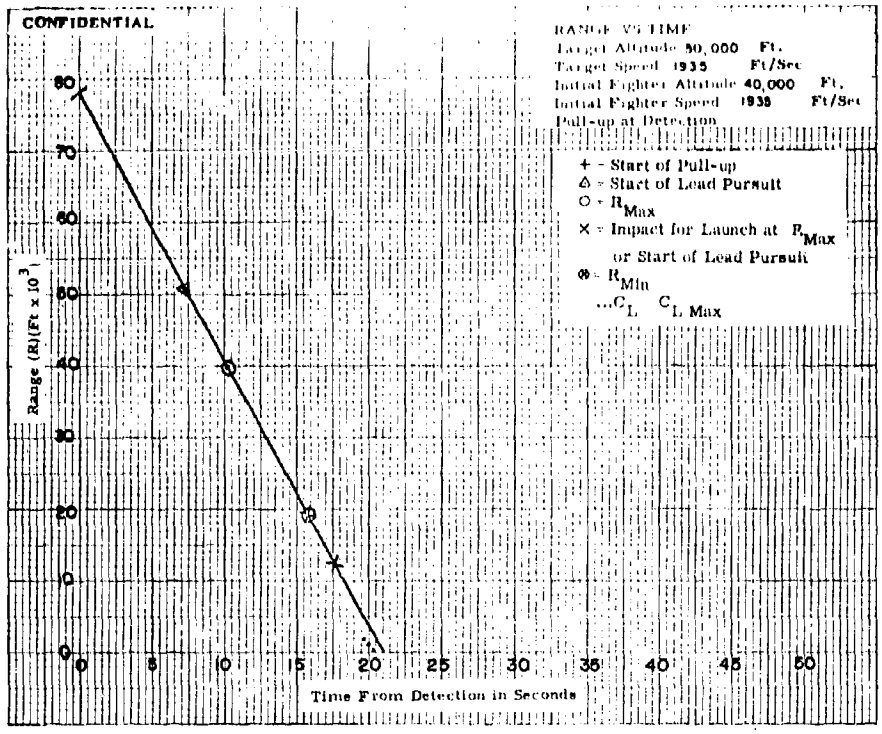

TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 870 Ft/Sec
Initial Fighter Altitude-35,000 Ft.
Initial Fighter Speed- 870 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 28
2 | 30
Target Aspect Angle (Ψ)(°)
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10³

Figure 309


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
Δ = Start of Lead Pursuit
O = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min ...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds

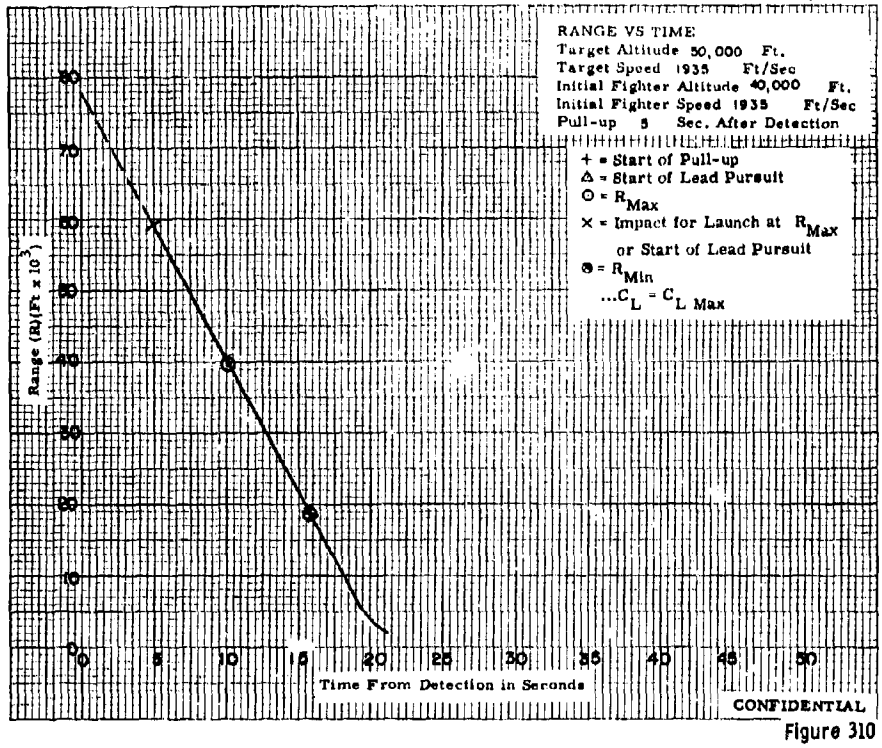

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
+ = Start of Pull-up
Δ = Start of Lead Pursuit
O = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min ...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 310

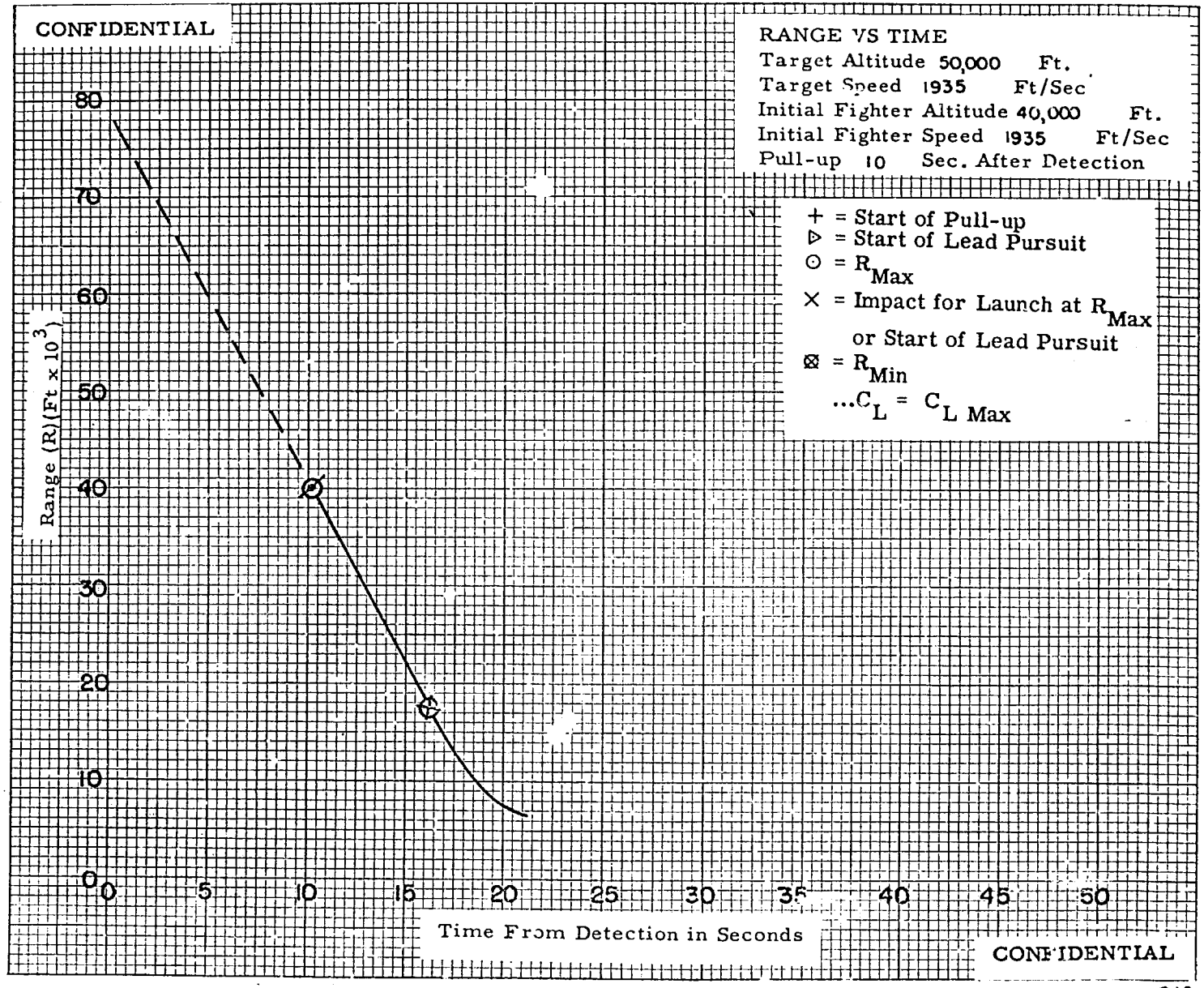
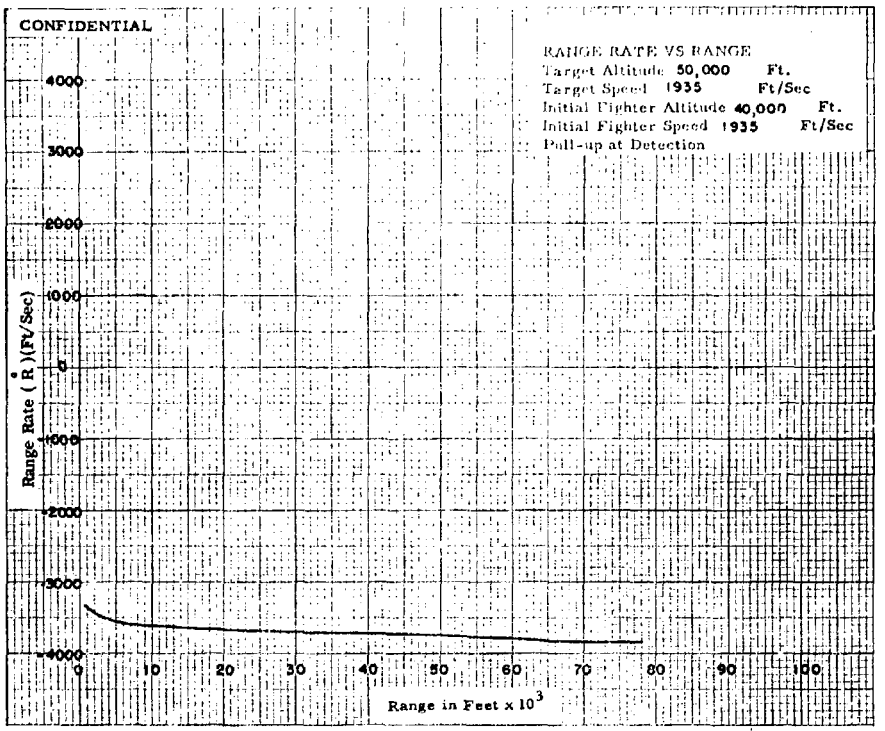
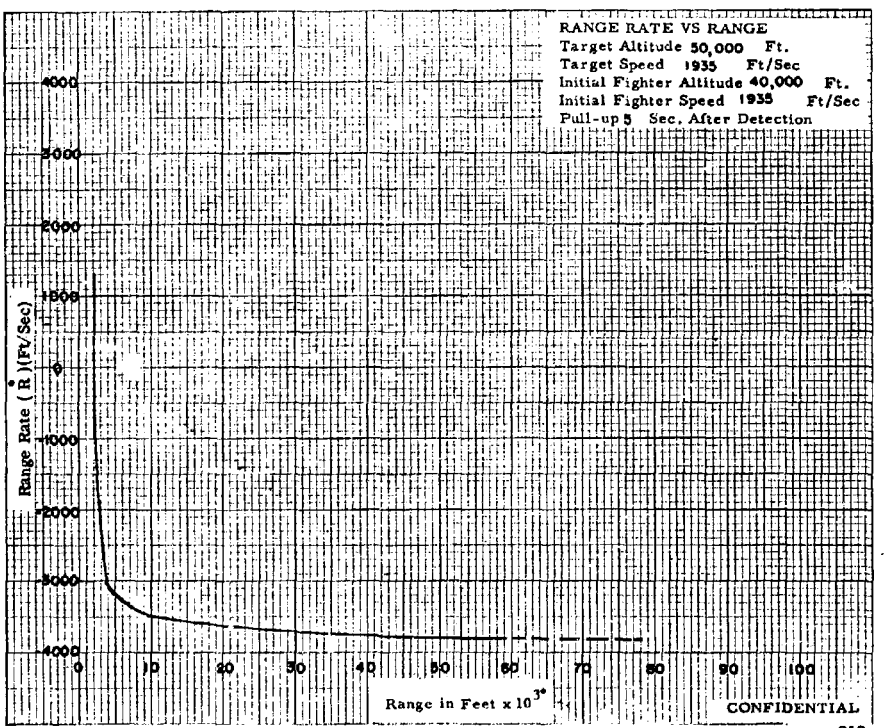

CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
CONFIDENTIAL

Figure 311

CONFIDENTIAL





CONFIDENTIAL

.gure 312

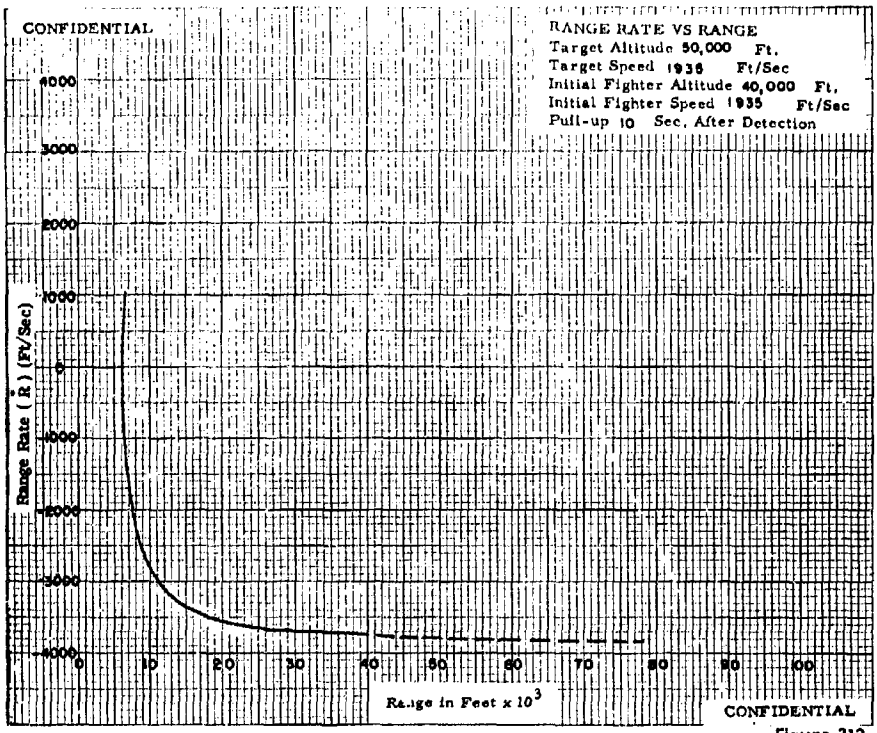


Figure 313

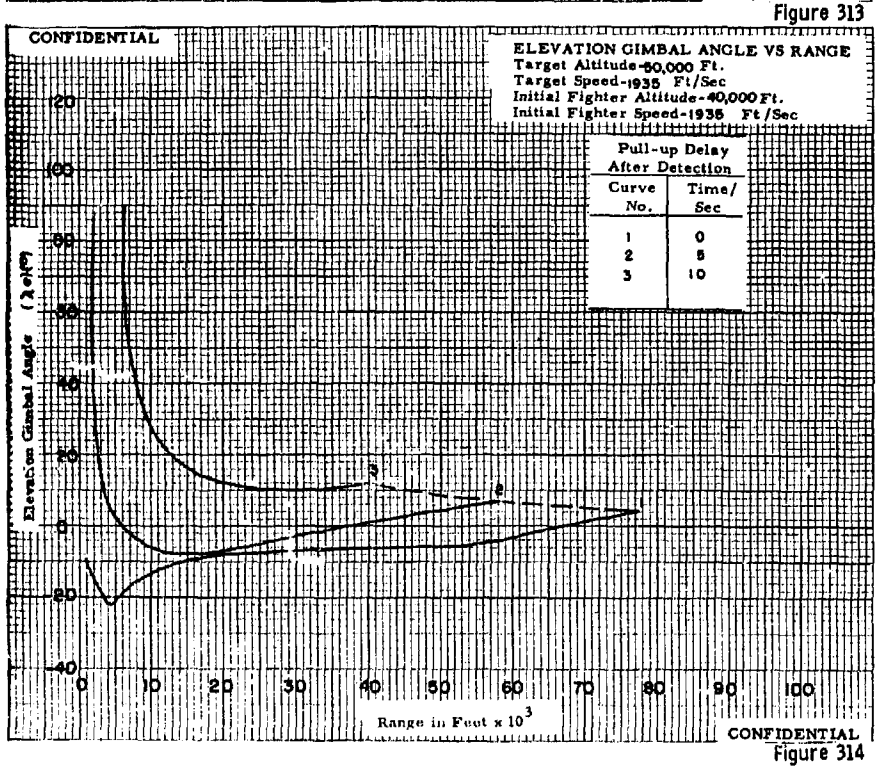
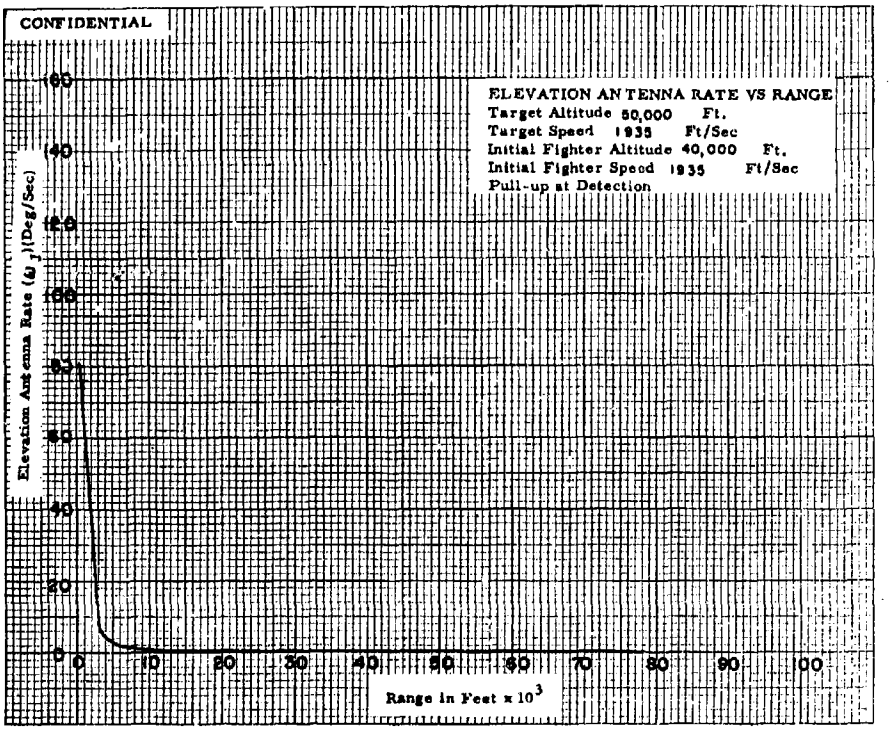


Figure 314


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Elevation Antenna Rate ($\dot{\epsilon}_T$)(Deg/Sec)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90
100

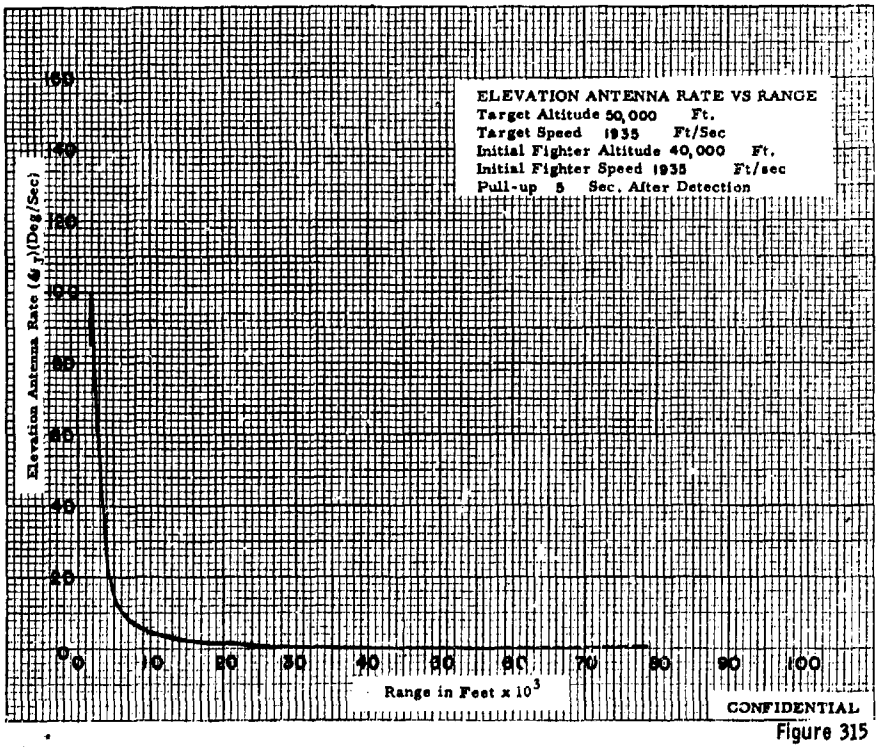

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/sec
Pull-up 5 Sec. After Detection
Elevation Antenna Rate ($\dot{\epsilon}_T$)(Deg/Sec)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90
100

Figure 315

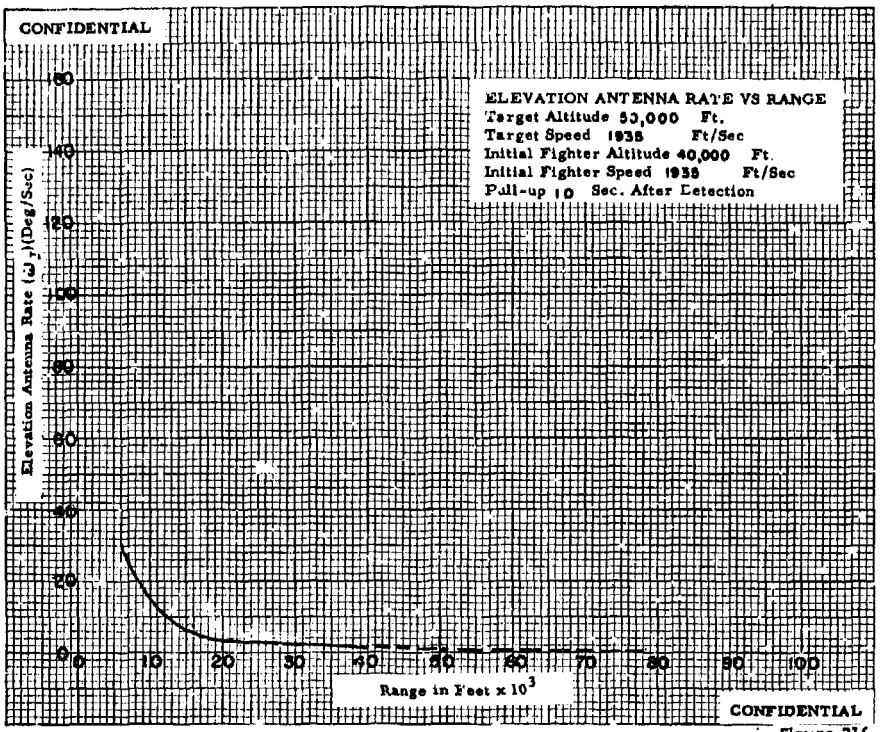


Figure 316

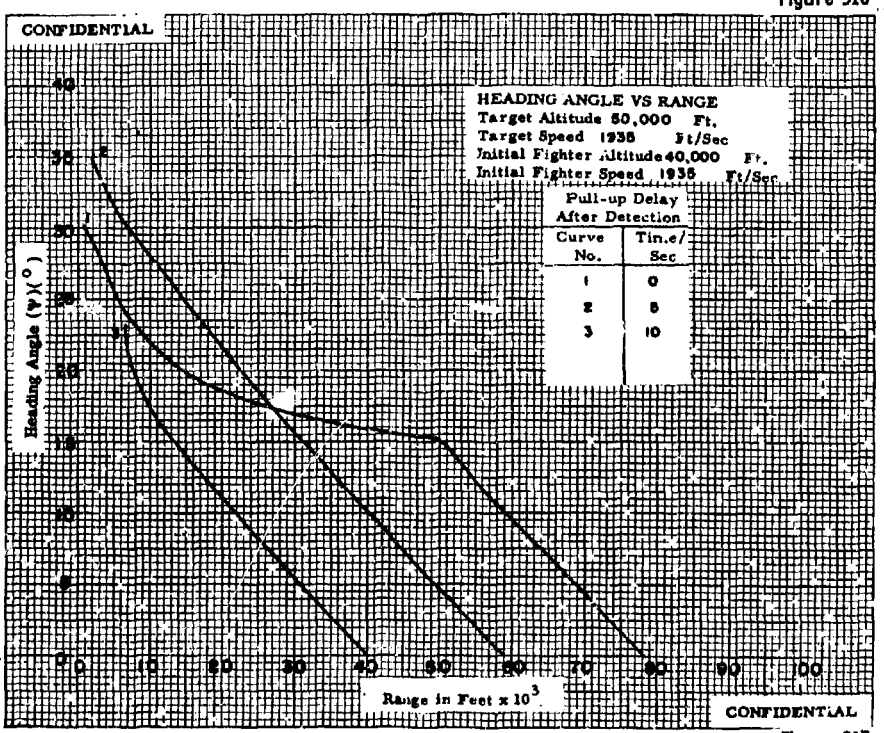
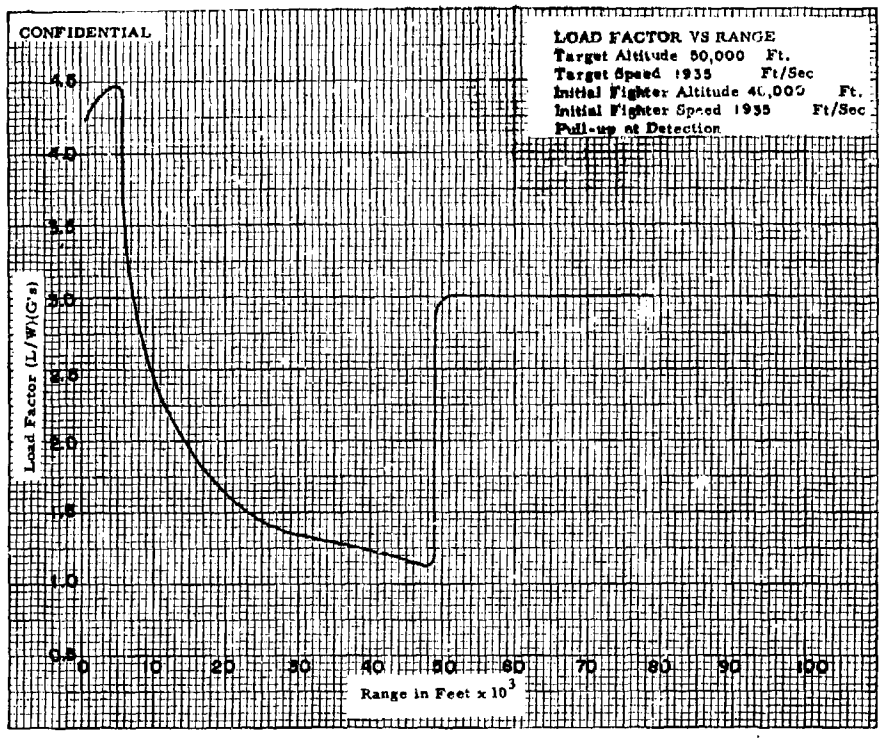


Figure 317


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

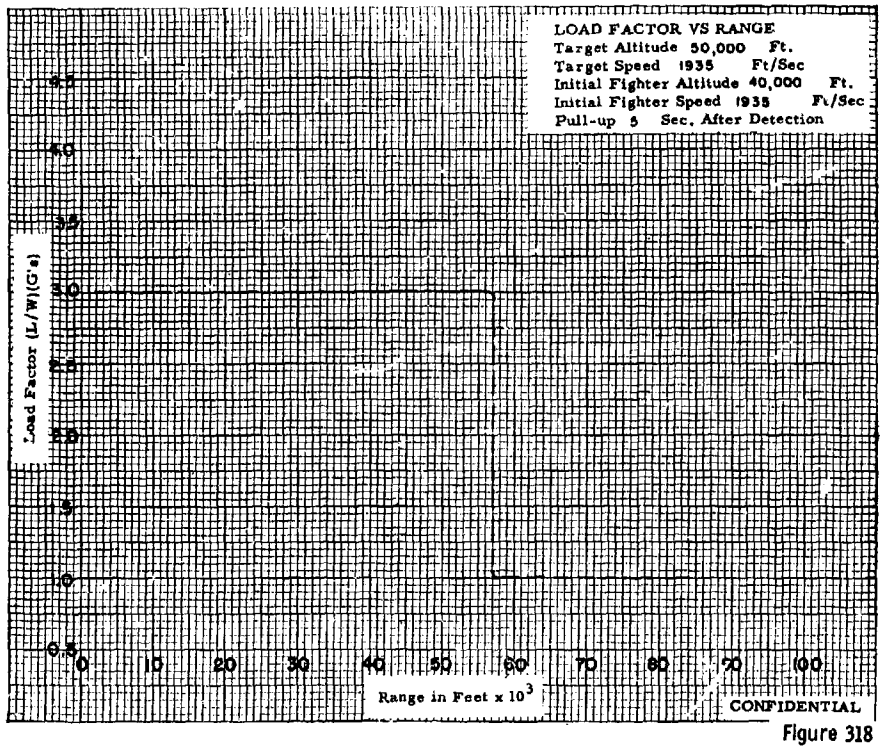

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 318

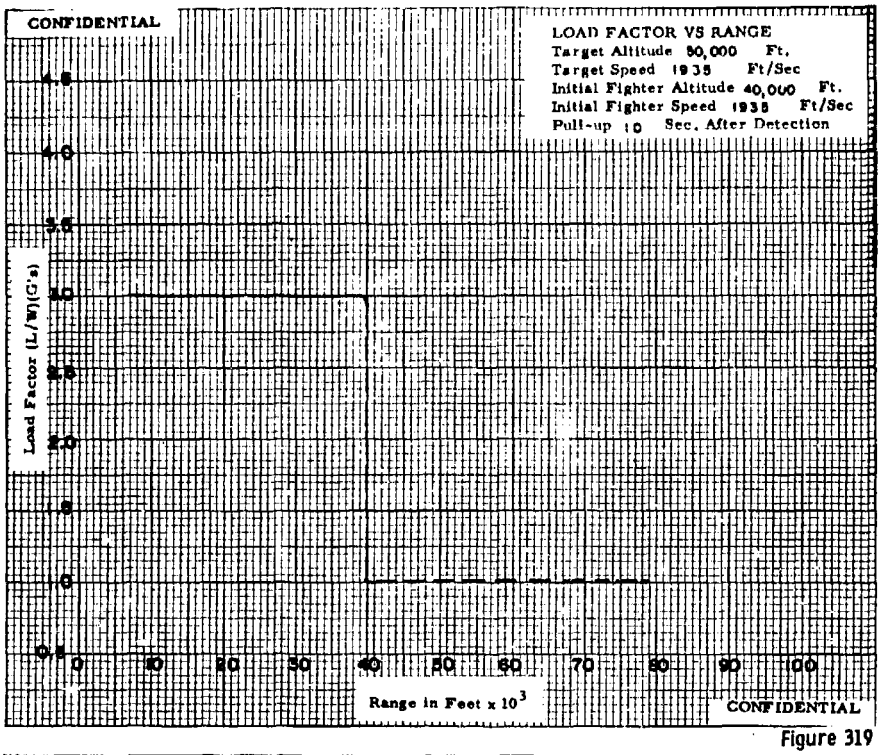


Figure 319

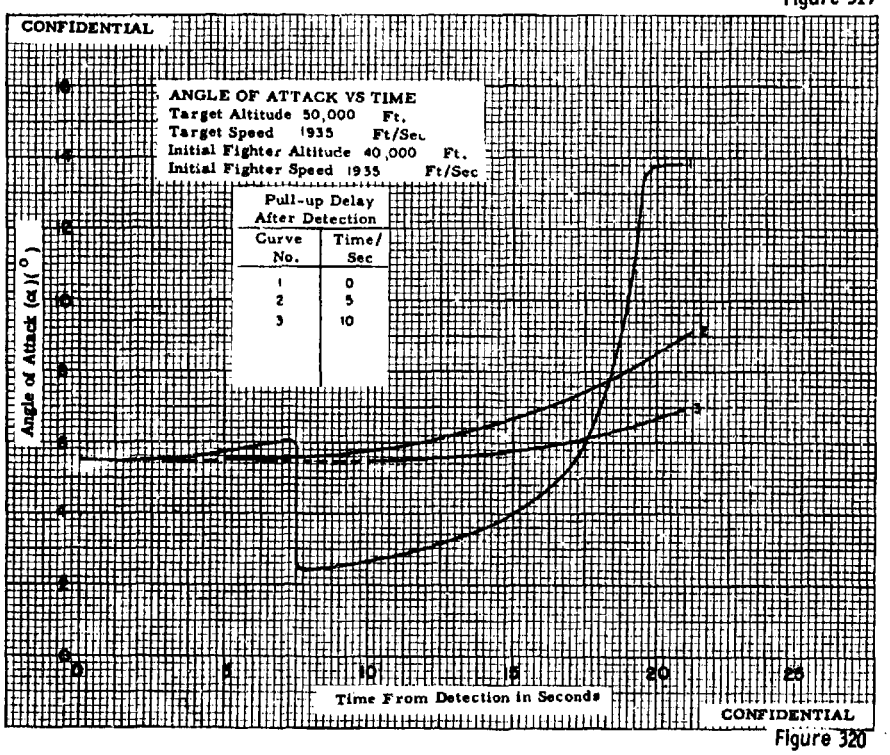


Figure 320

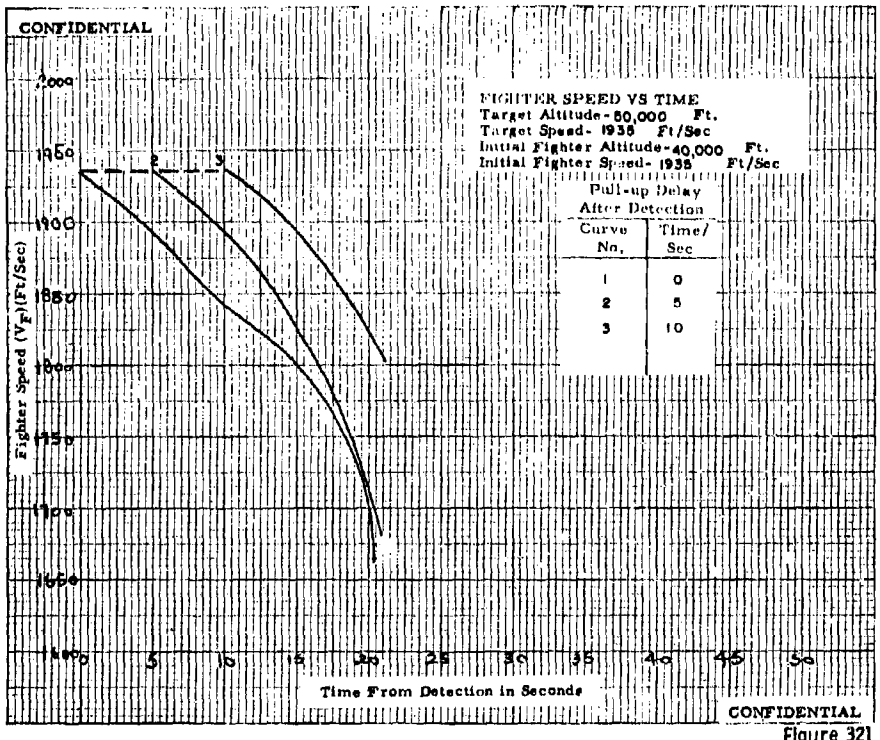


Figure 321

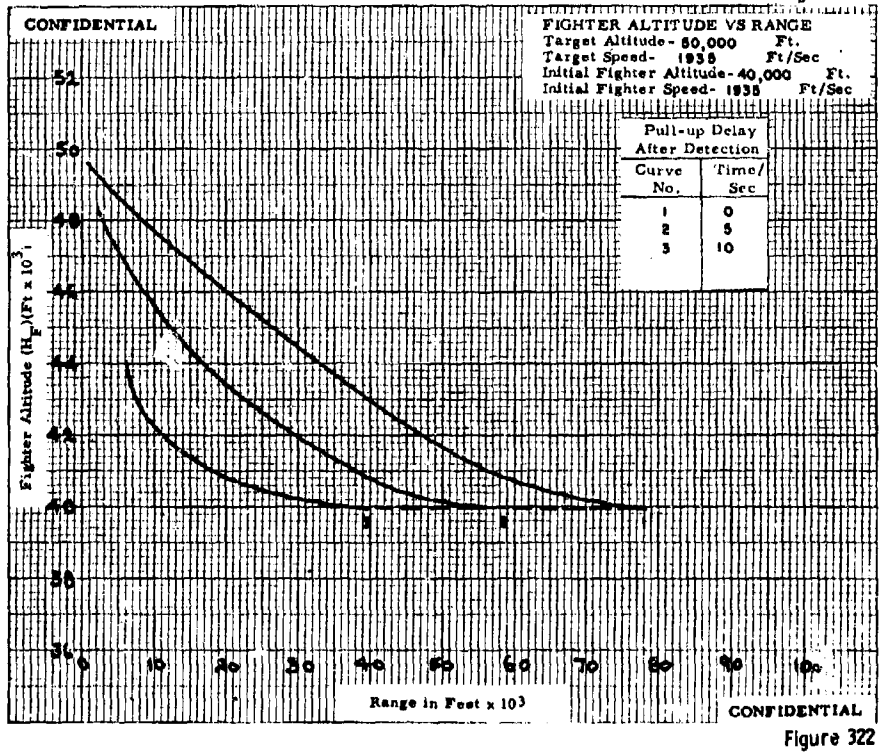
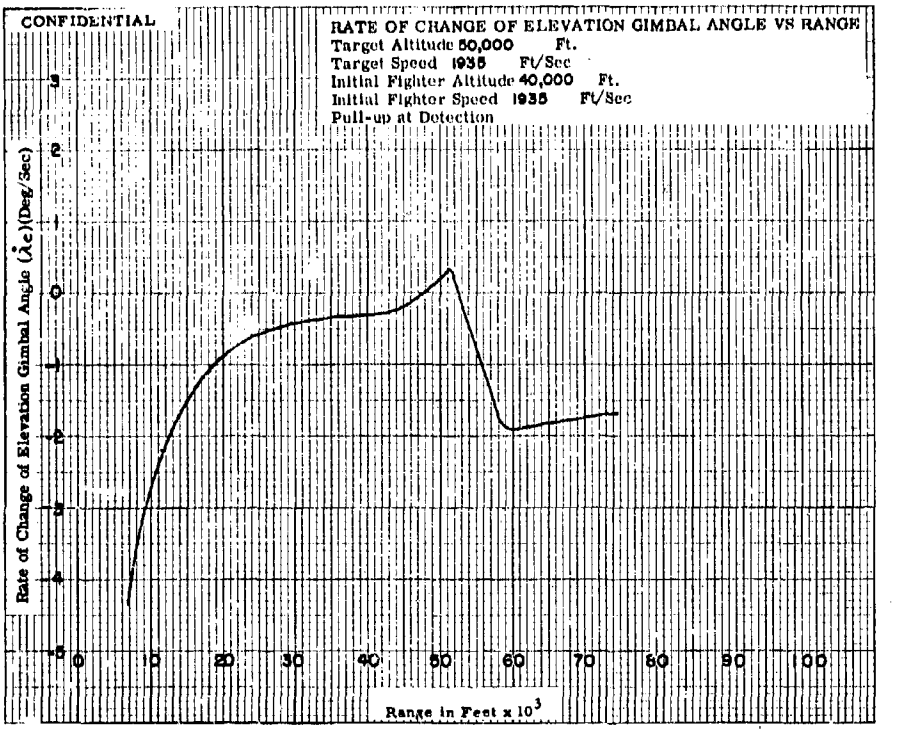


Figure 322


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
Range in Feet x 10^3

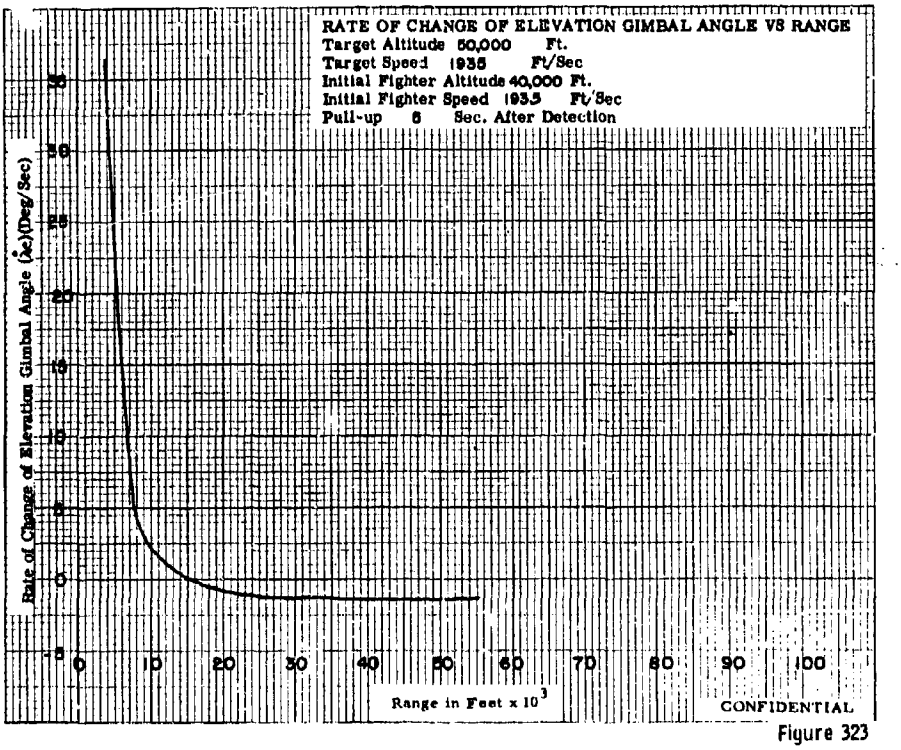

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 6 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
Range in Feet x 10^3

Figure 323

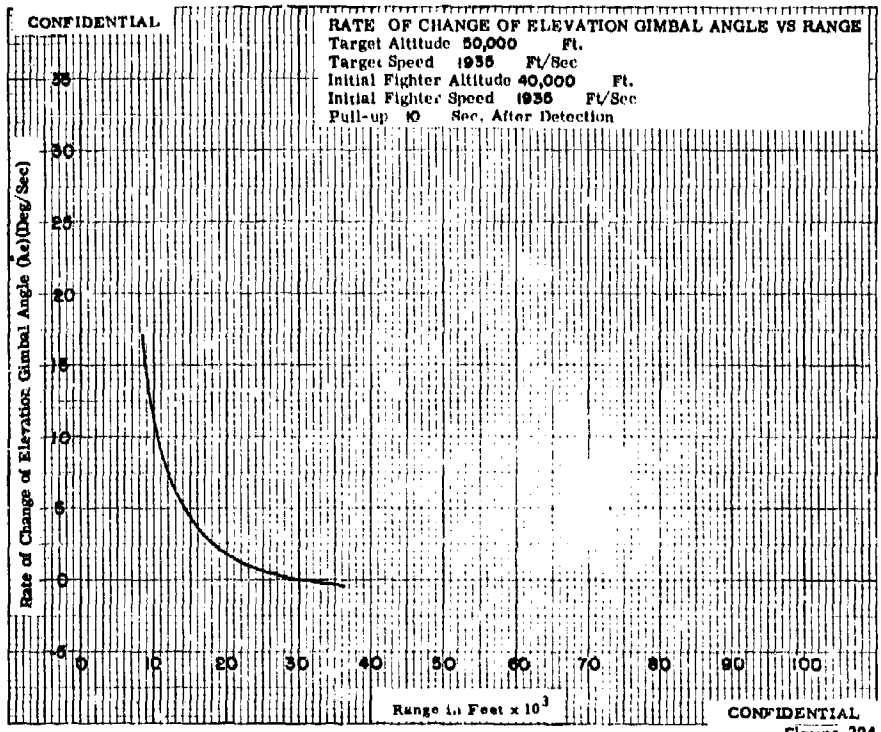


Figure 324

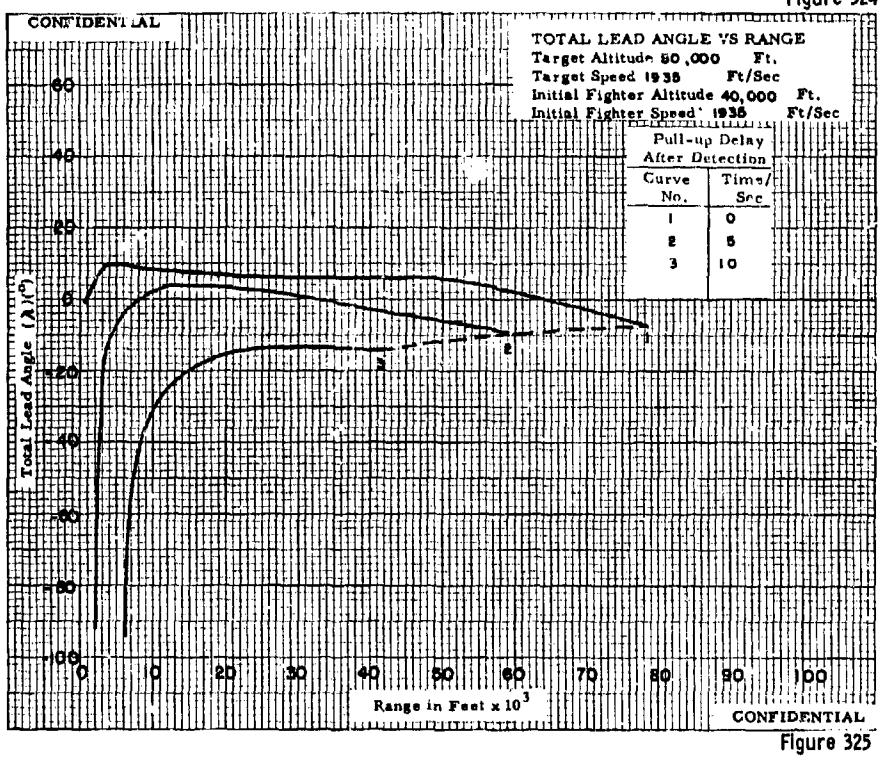
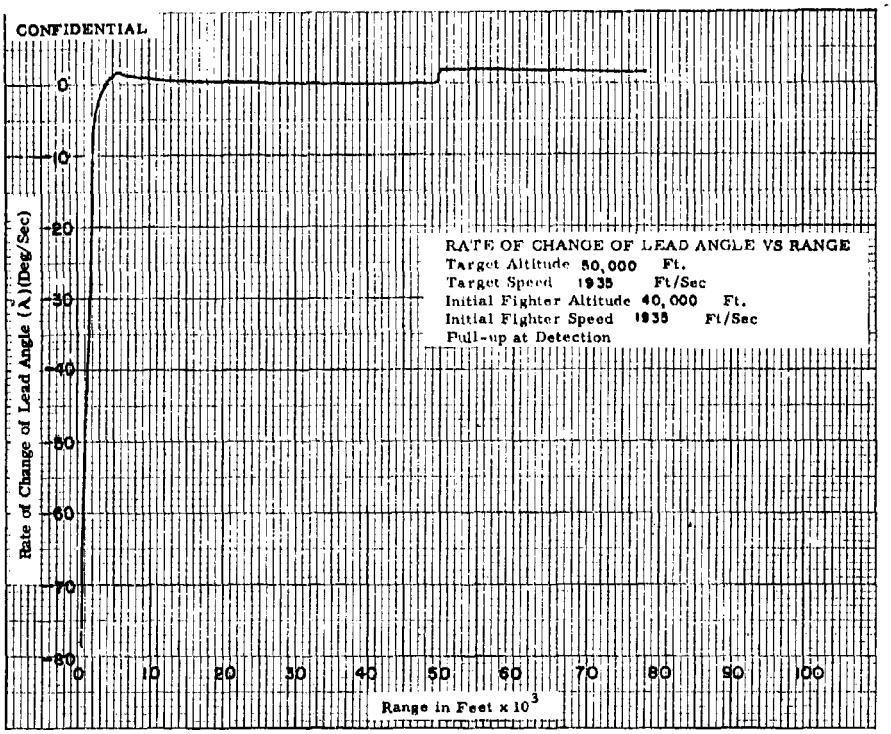


Figure 325


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-10
-20
-30
-40
-50
-60
-70
-80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

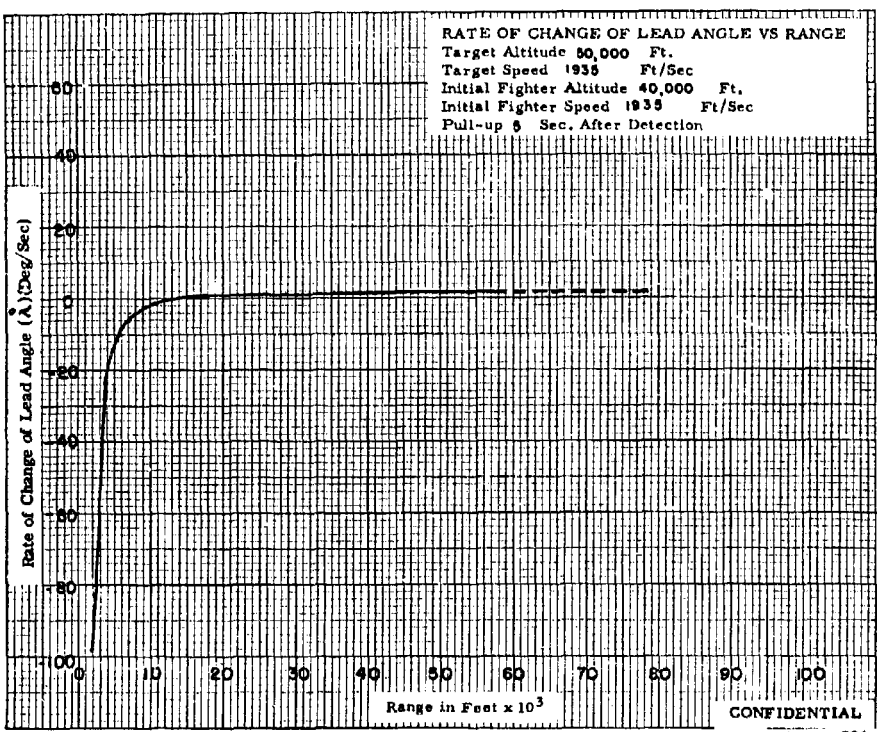

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1935 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
60
40
20
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 326

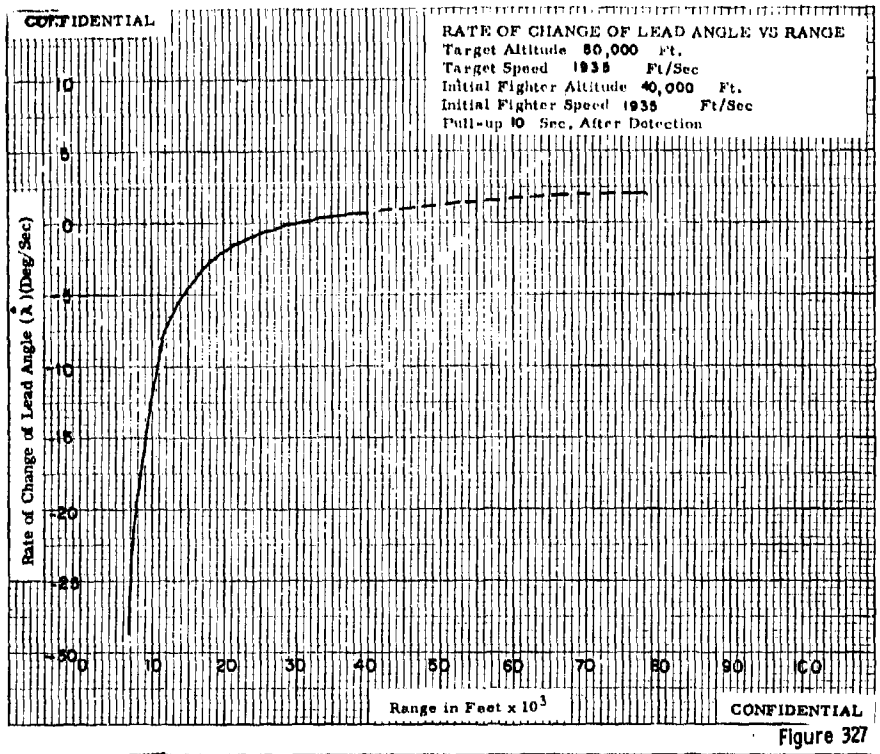


Figure 327

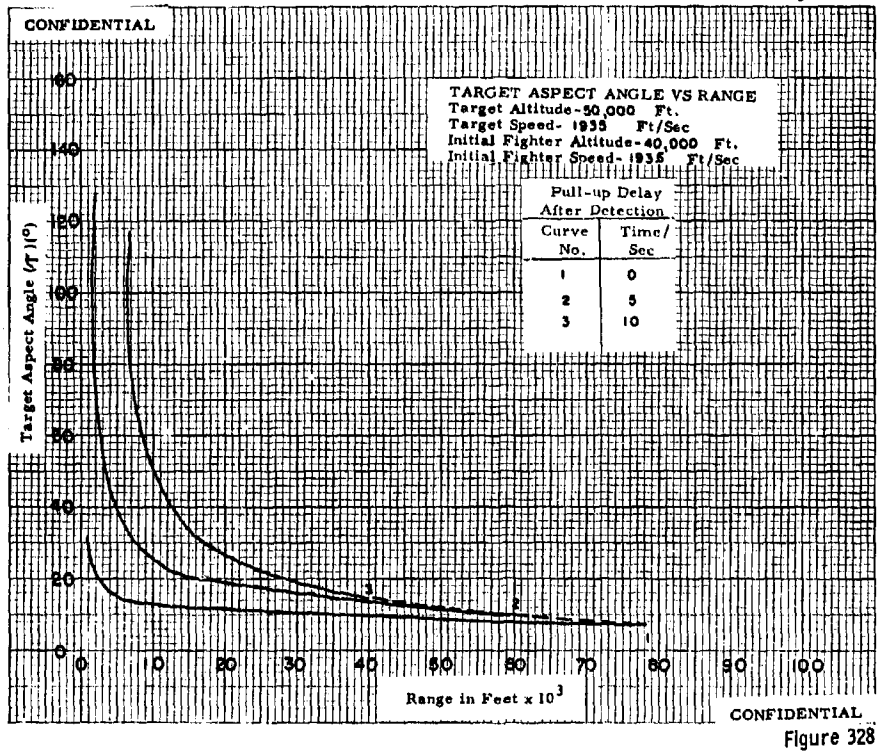


Figure 328

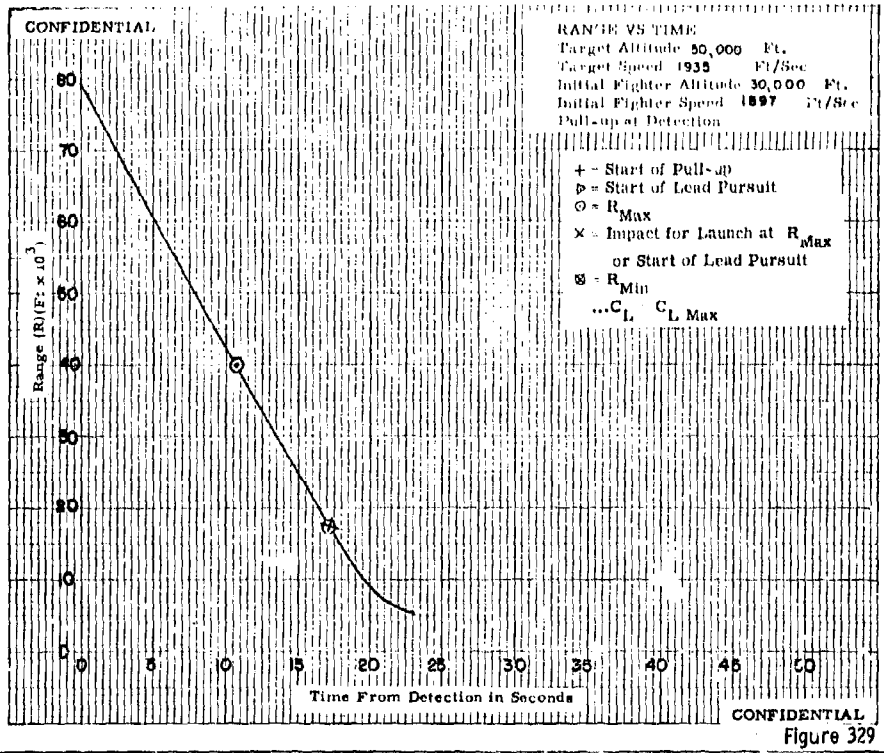


Figure 329

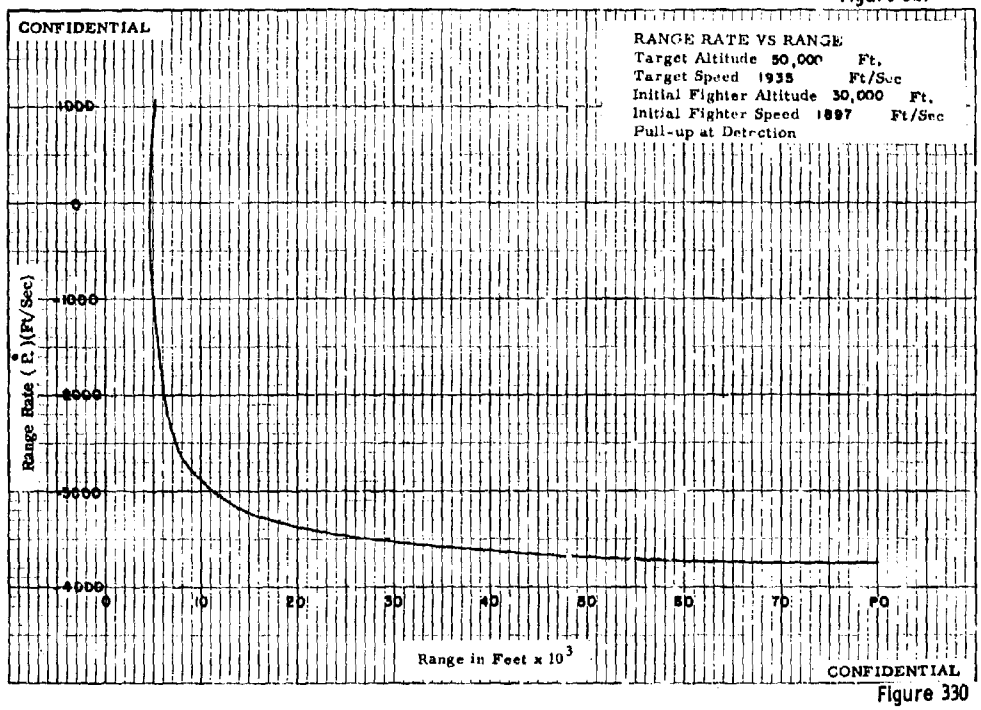


Figure 330

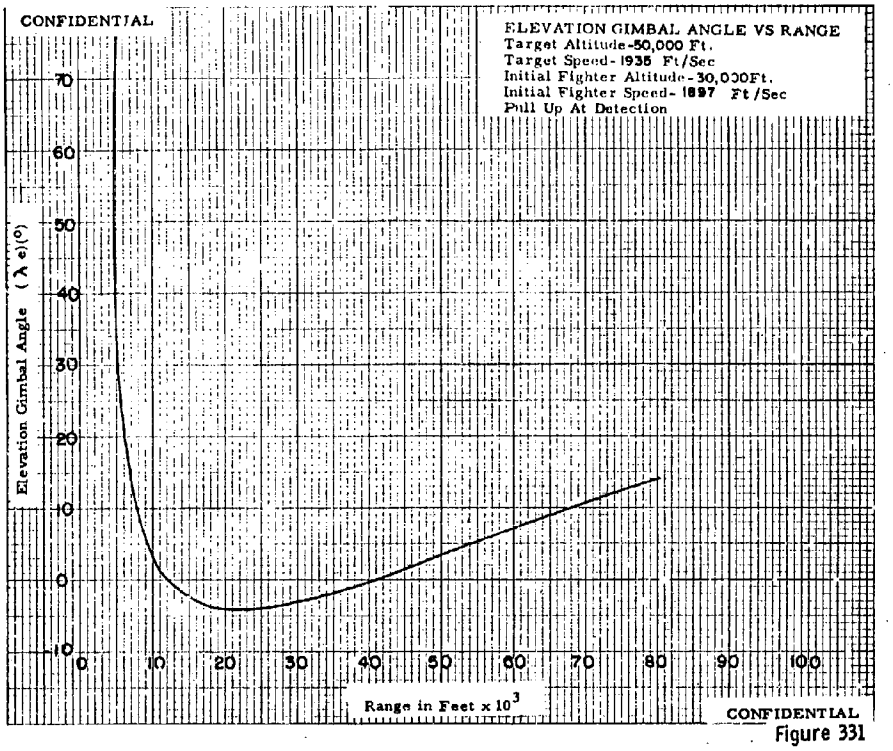


Figure 331

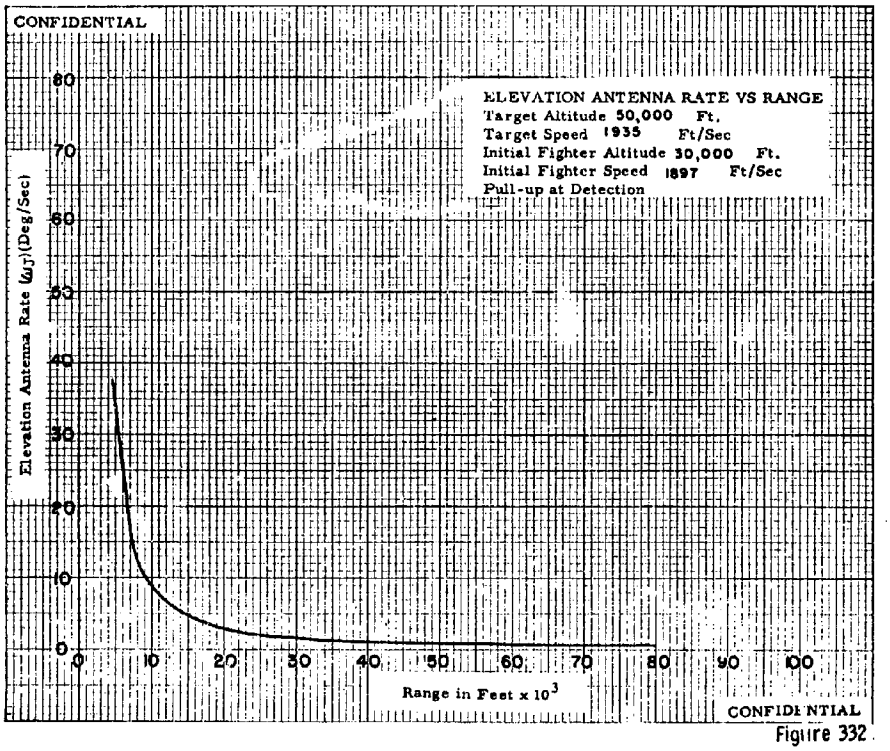


Figure 332

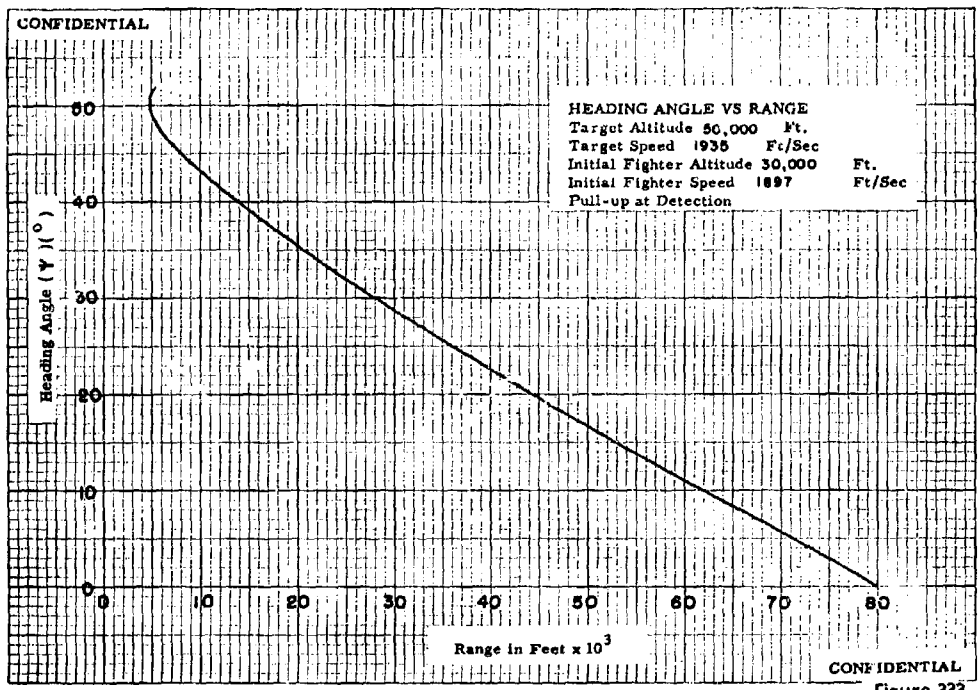


Figure 333

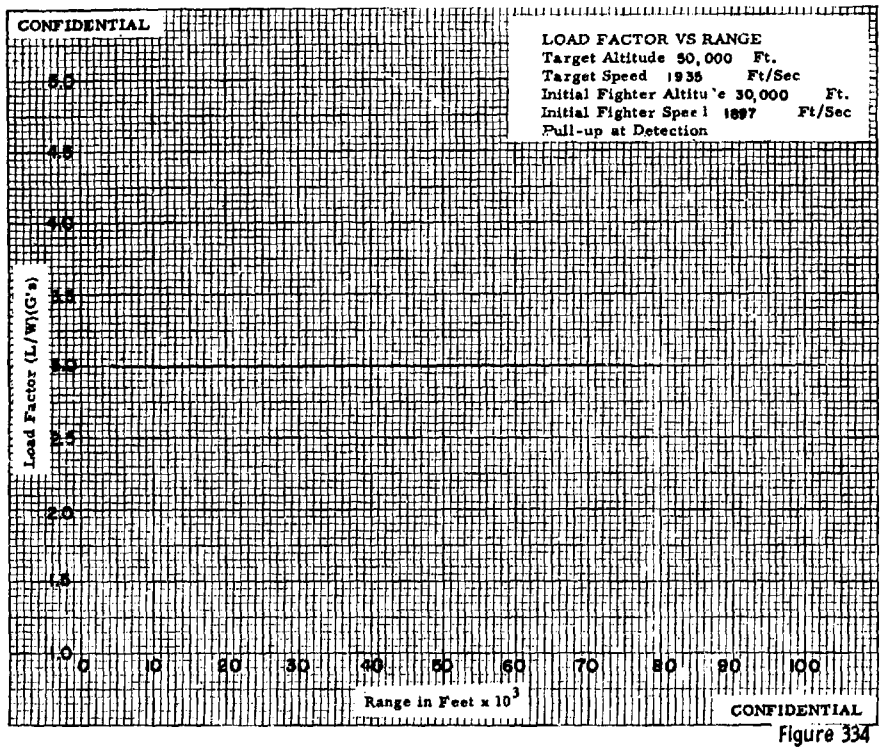


Figure 334

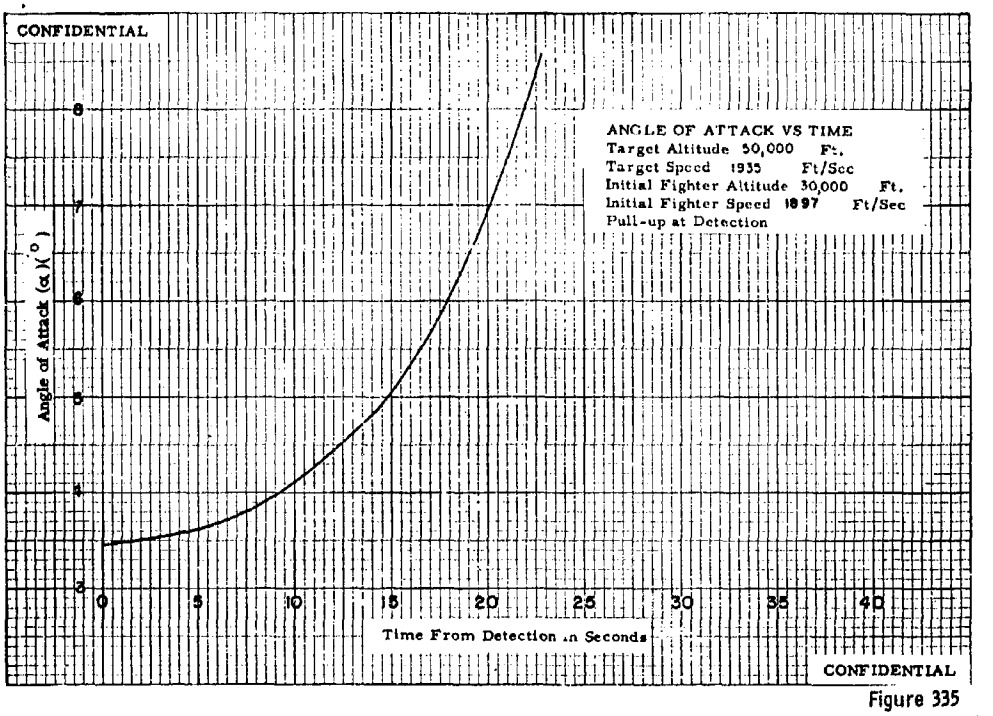


Figure 335

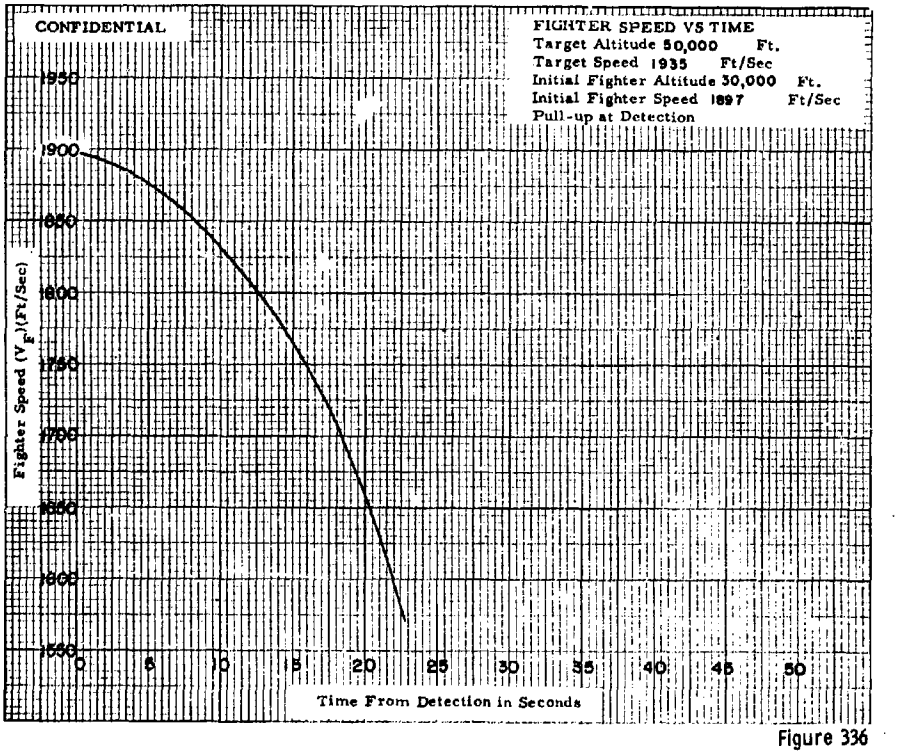


Figure 336

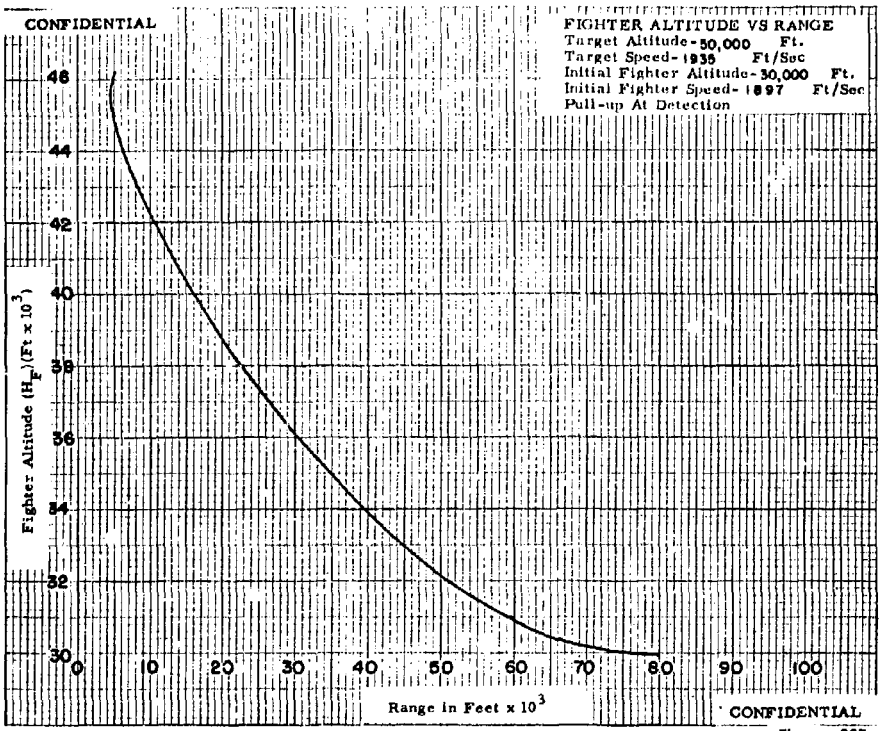


Figure 337

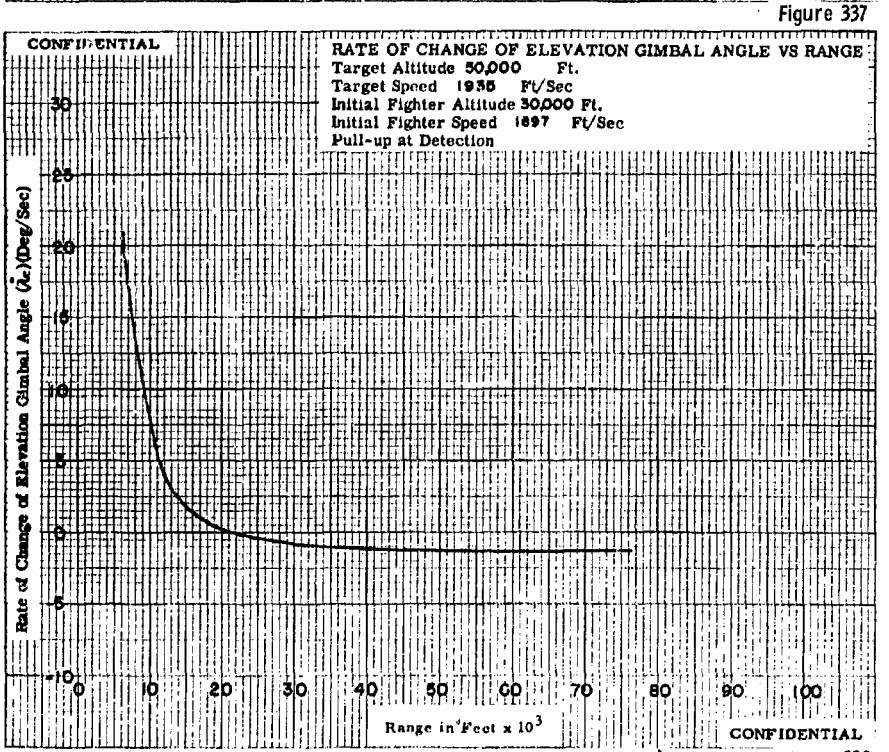


Figure 338

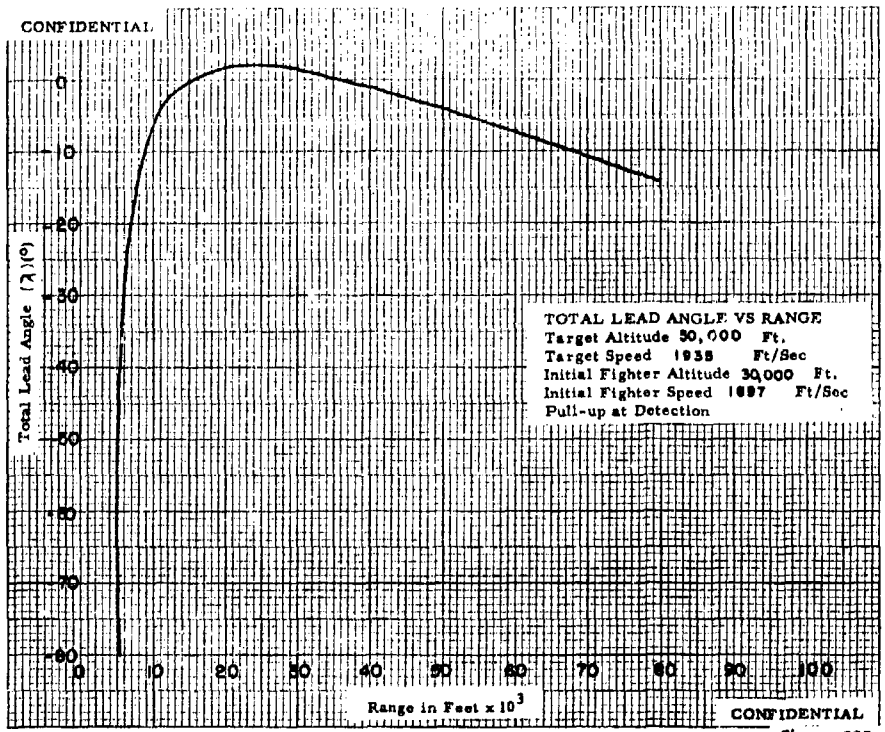


Figure 339

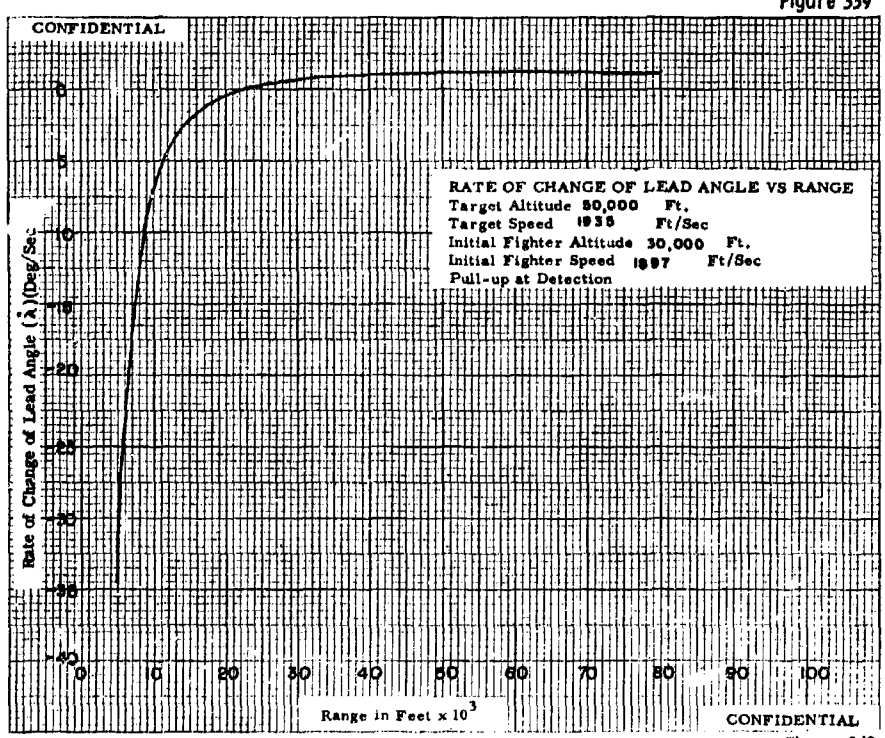


Figure 340

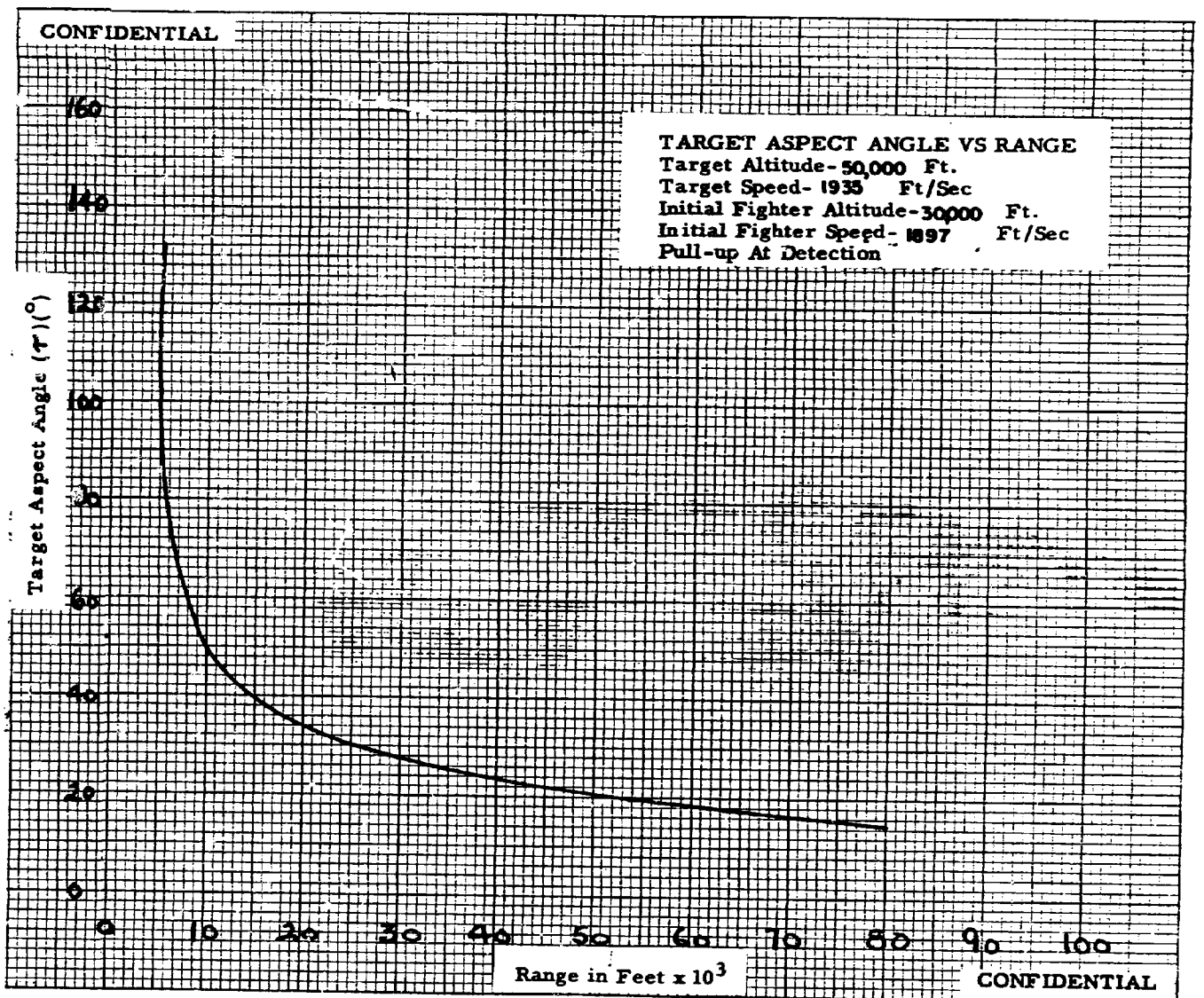
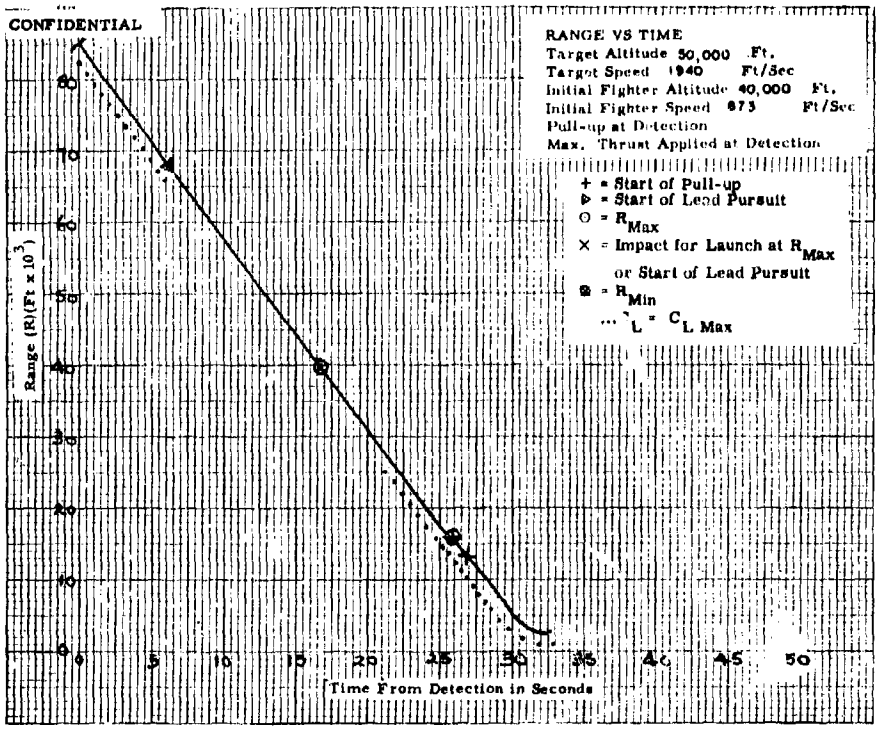

CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude- 50,000 Ft.
Target Speed- 1935 Ft/Sec
Initial Fighter Altitude- 30000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Pull-up At Detection
Target Aspect Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 341


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R_{Max}
X = Impact for Launch at R_{Max} or Start of Lead Pursuit
■ = R_{Min}
... C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

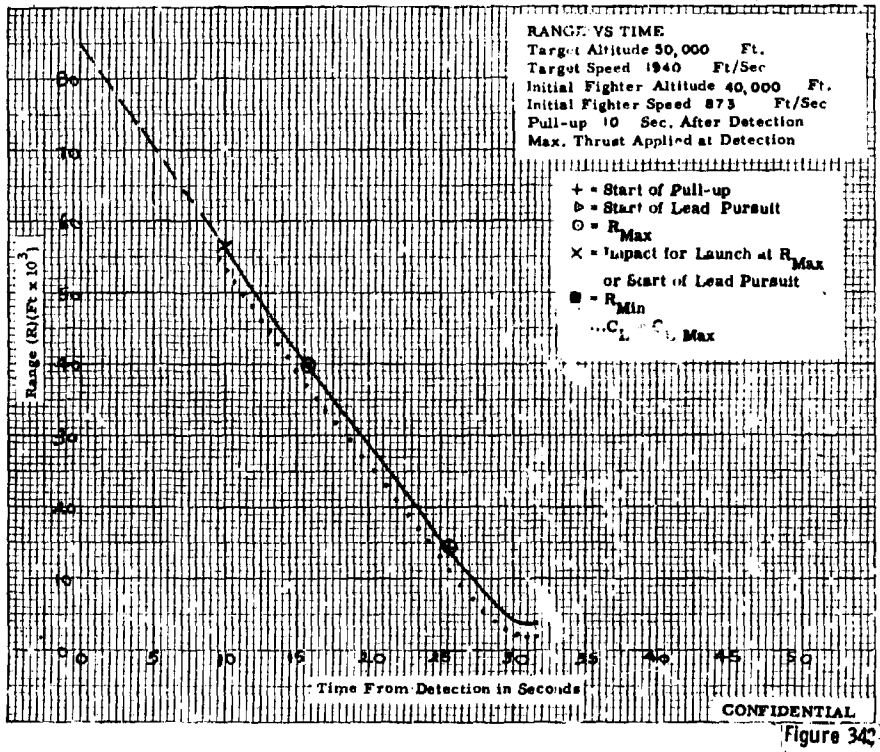
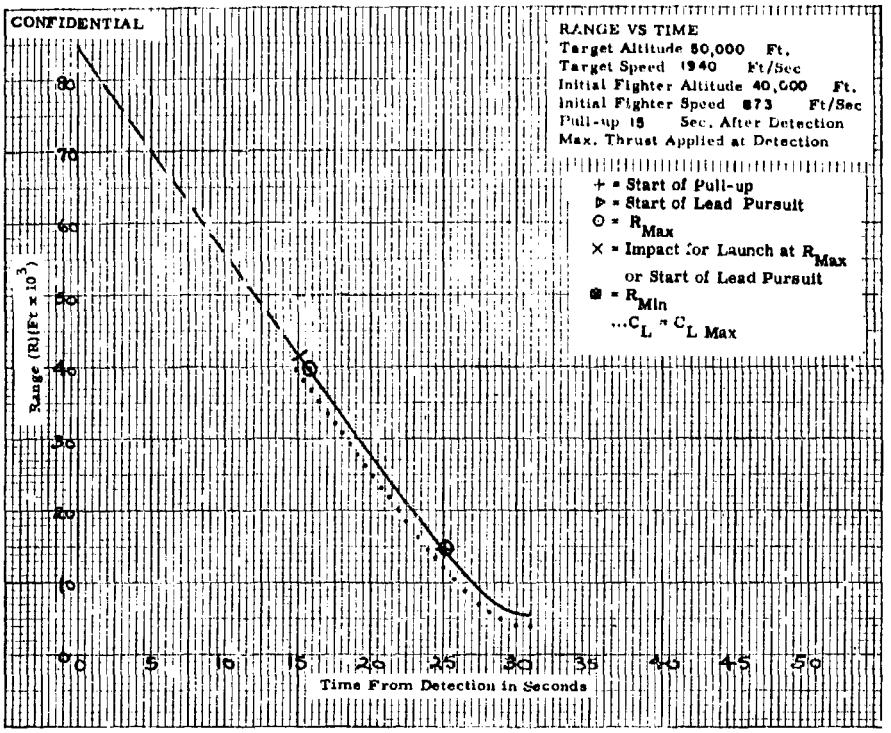

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R_{Max}
X = Impact for Launch at R_{Max} or Start of Lead Pursuit
■ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 342


RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊠ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds

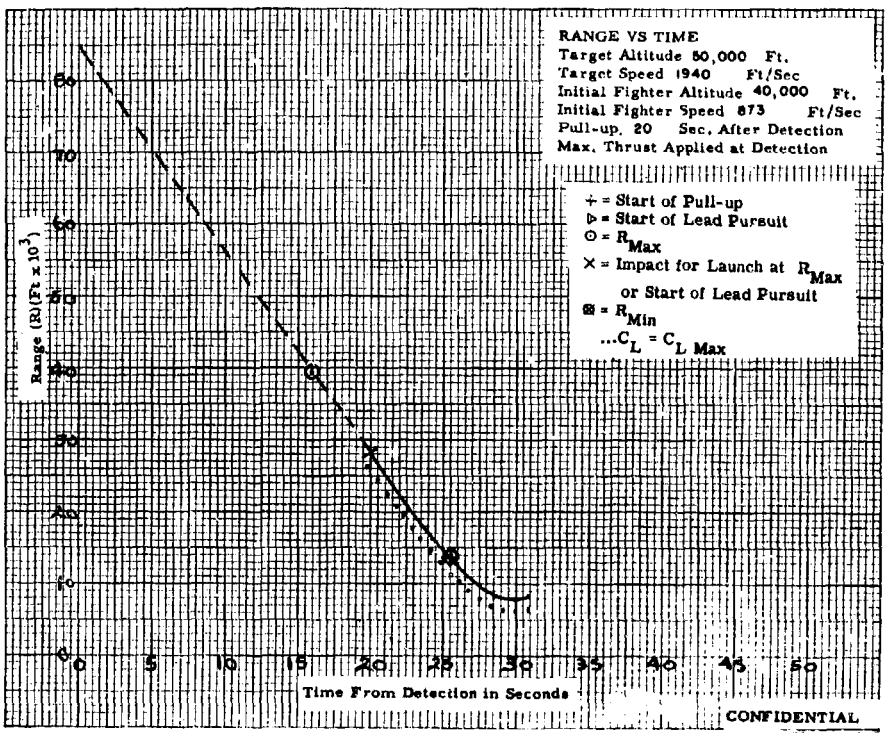
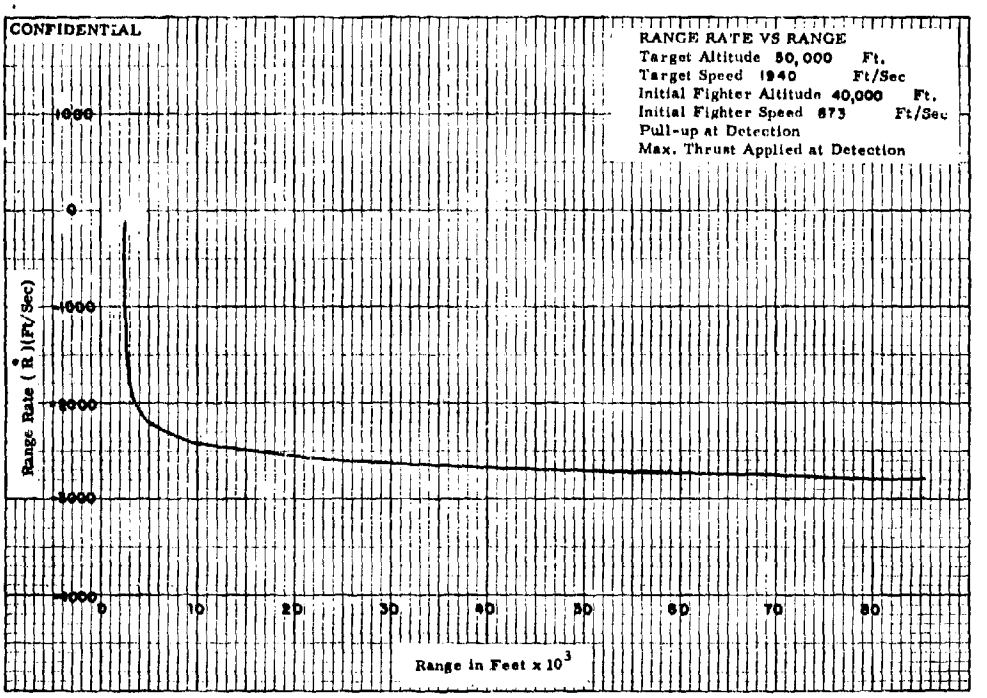

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up, 20 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊠ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds

Figure 343


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate ($\dot{R}$) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

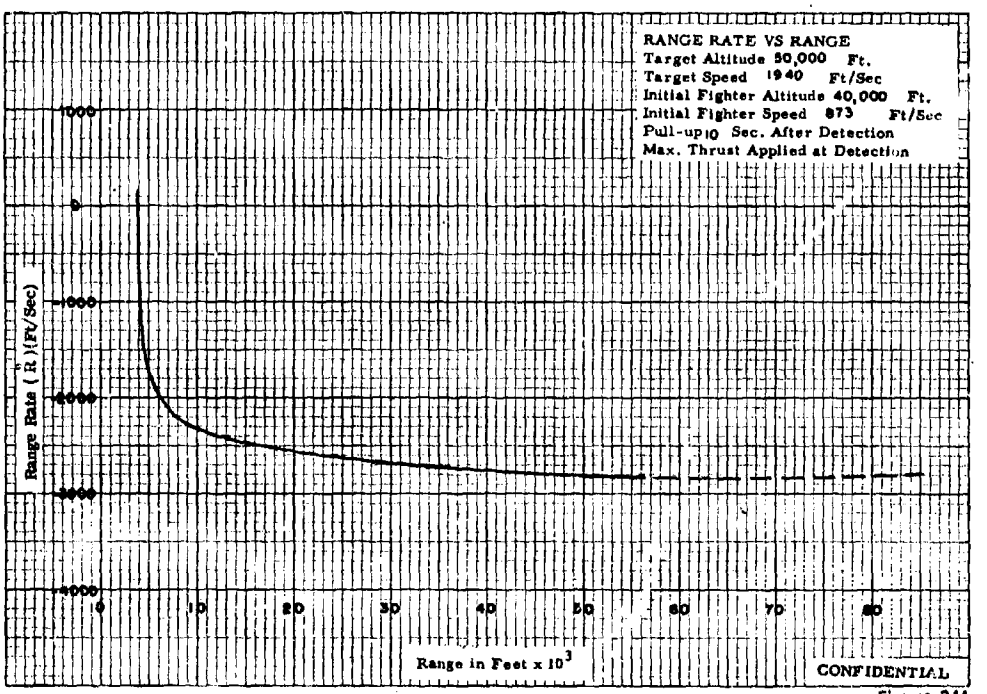
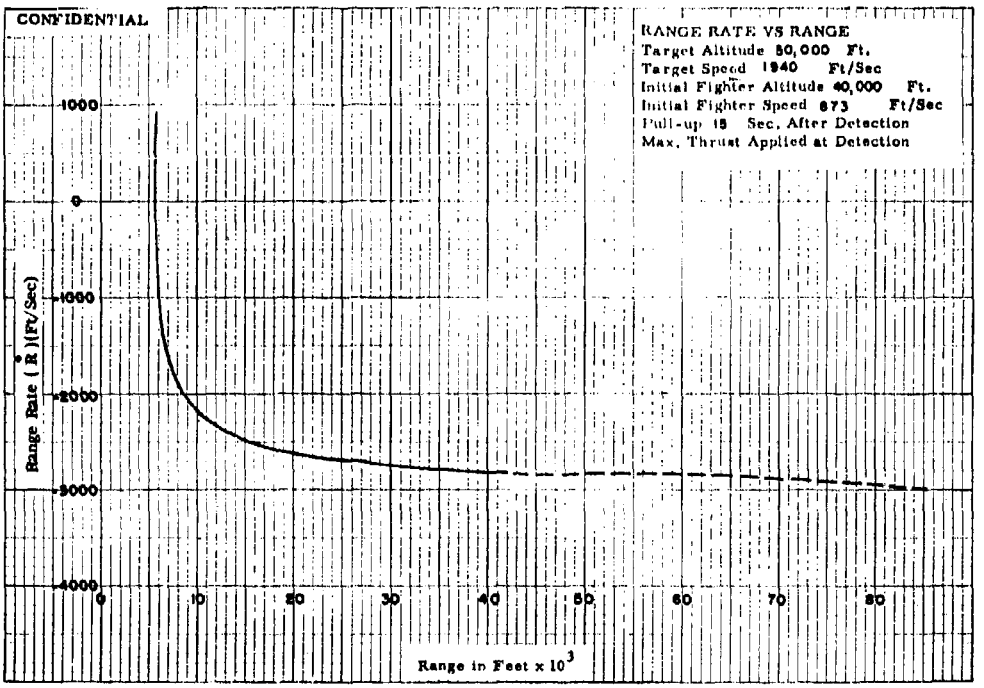

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate ($\dot{R}$) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

Figure 344


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

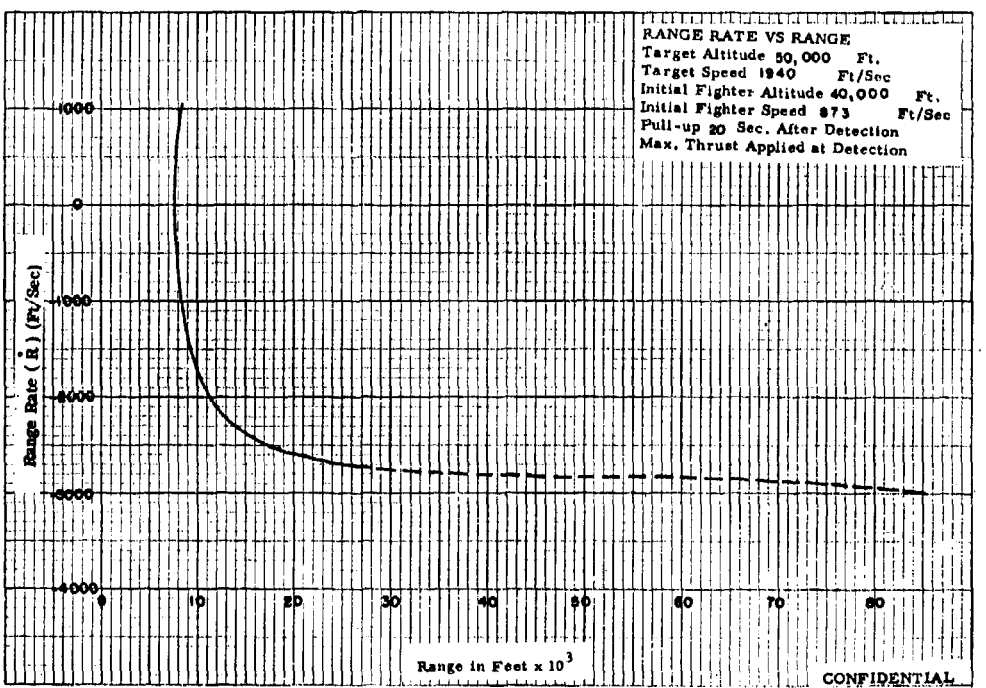
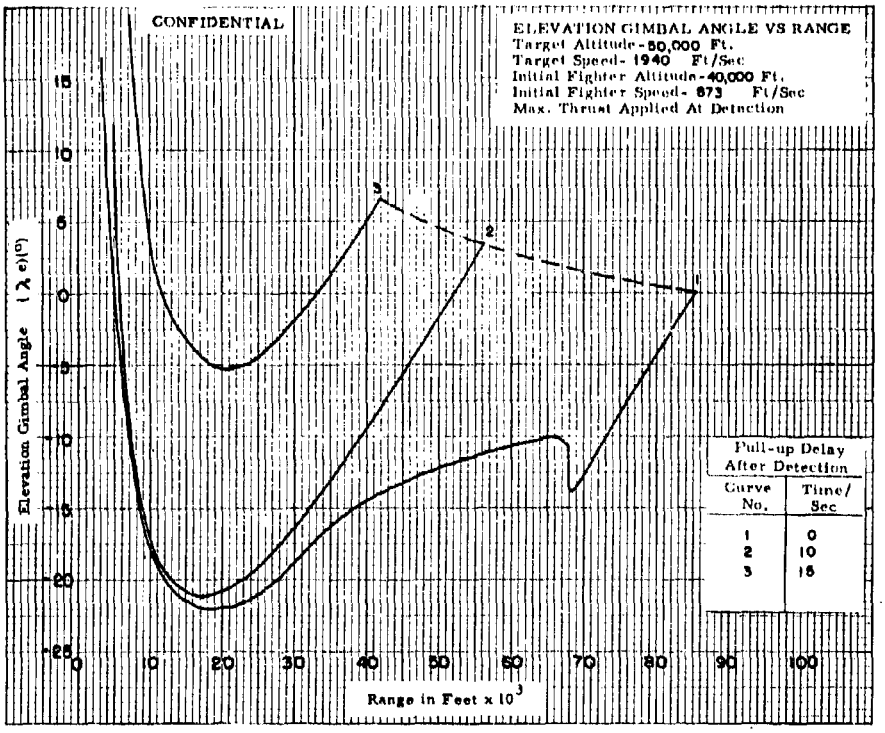

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

Figure 345


CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 15
Elevation Gimbal Angle (λ el)(°)
Range in Feet x 10³
15
10
5
0
-5
-10
-15
-20
-25
0
10
20
30
40
50
60
70
80
90
100

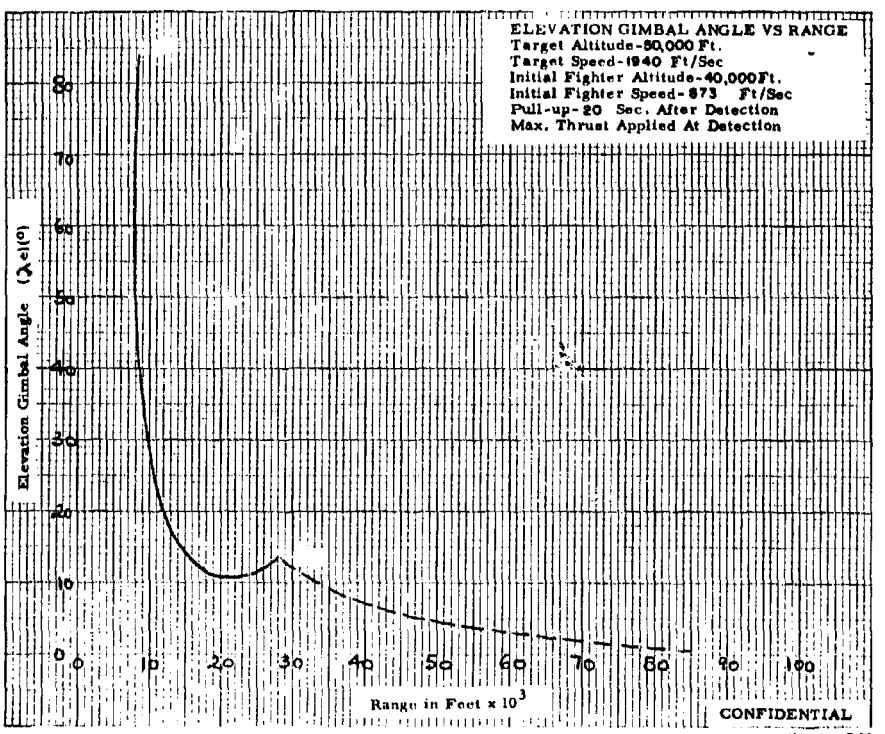
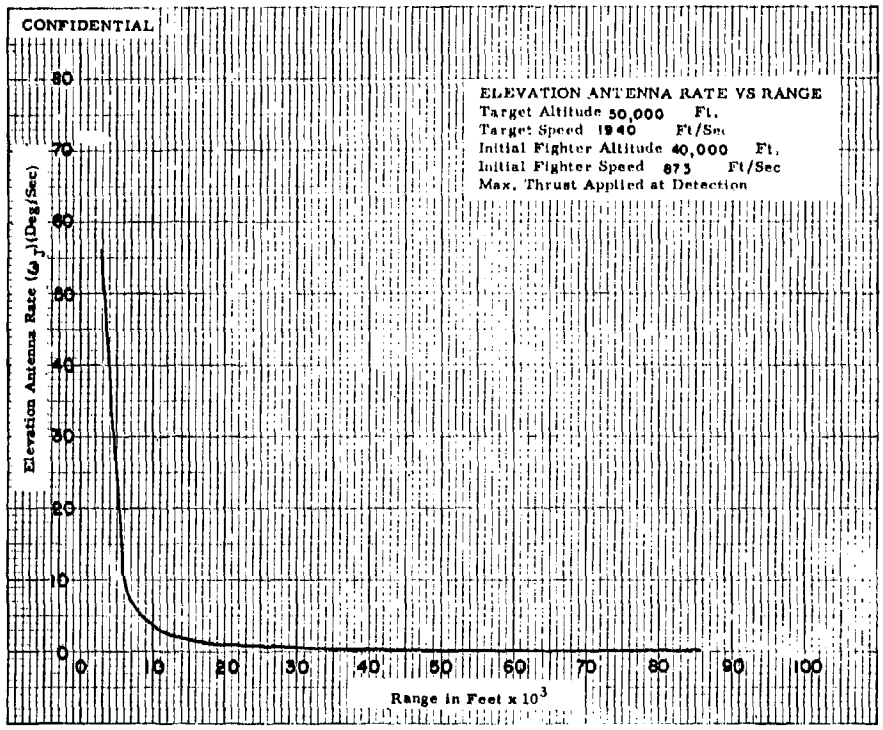

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-40,000Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λ el)(°)
Range in Feet x 10³
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
CONFIDENTIAL

Figure 346


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_J)(Deg/Sec)
Range in Feet x 10^3

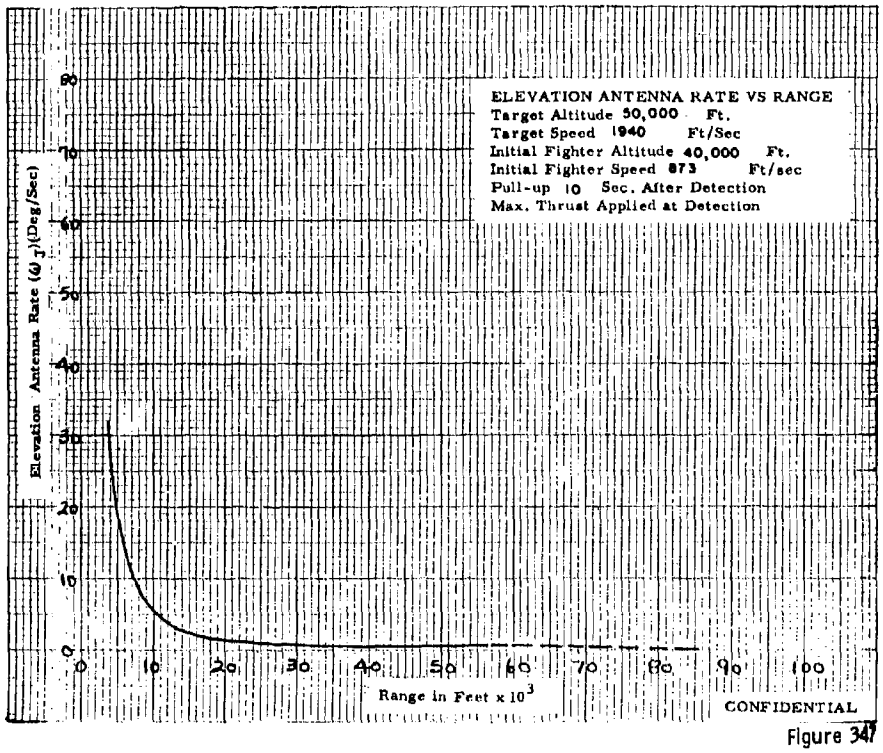

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_J)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 347

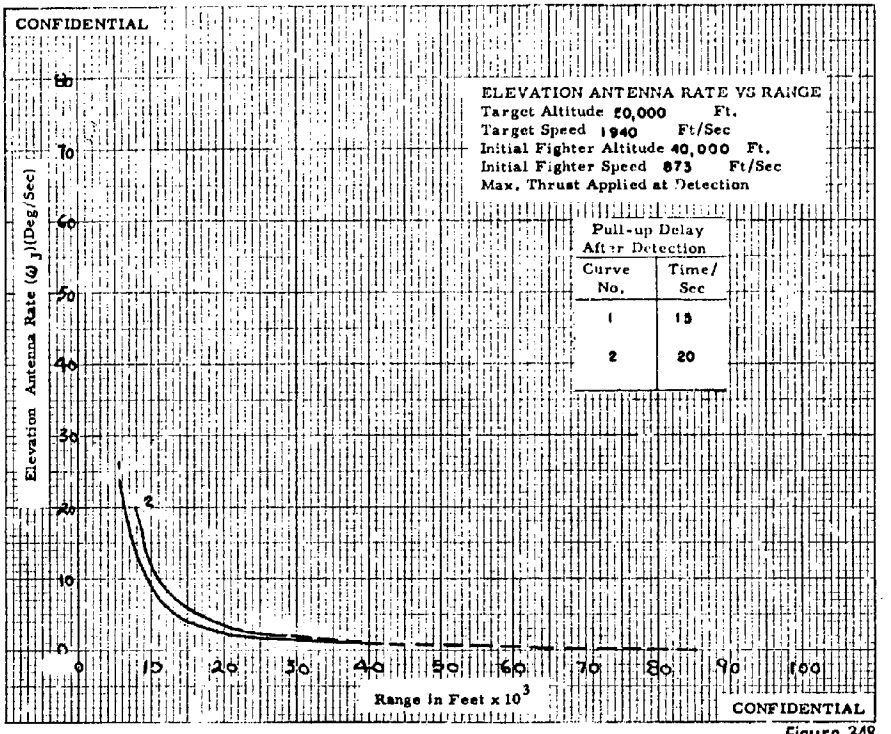


Figure 348

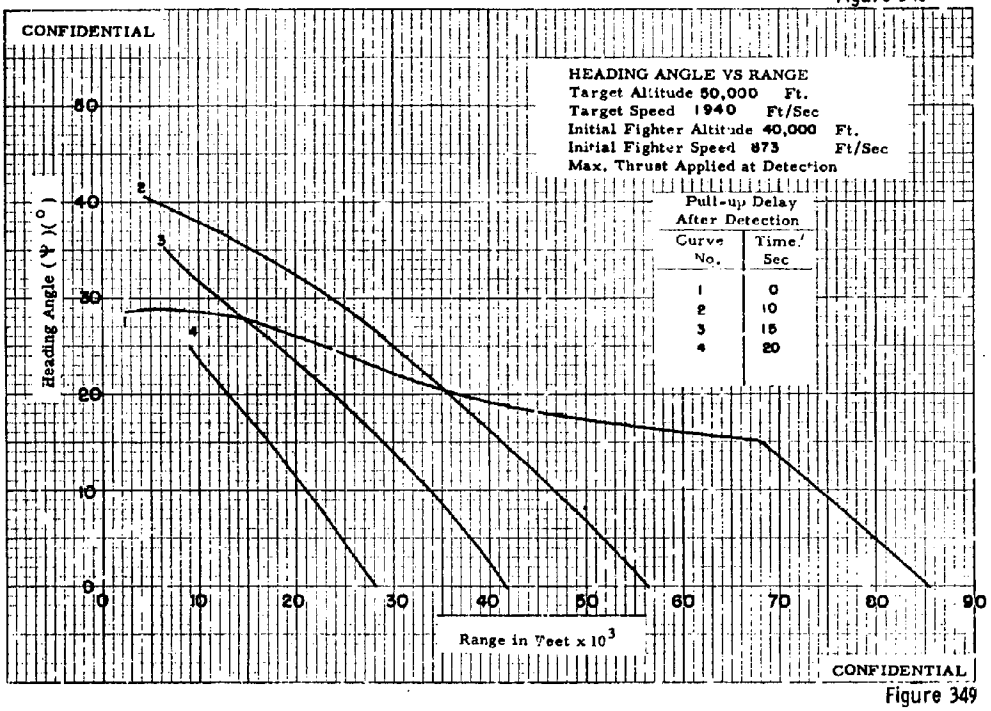
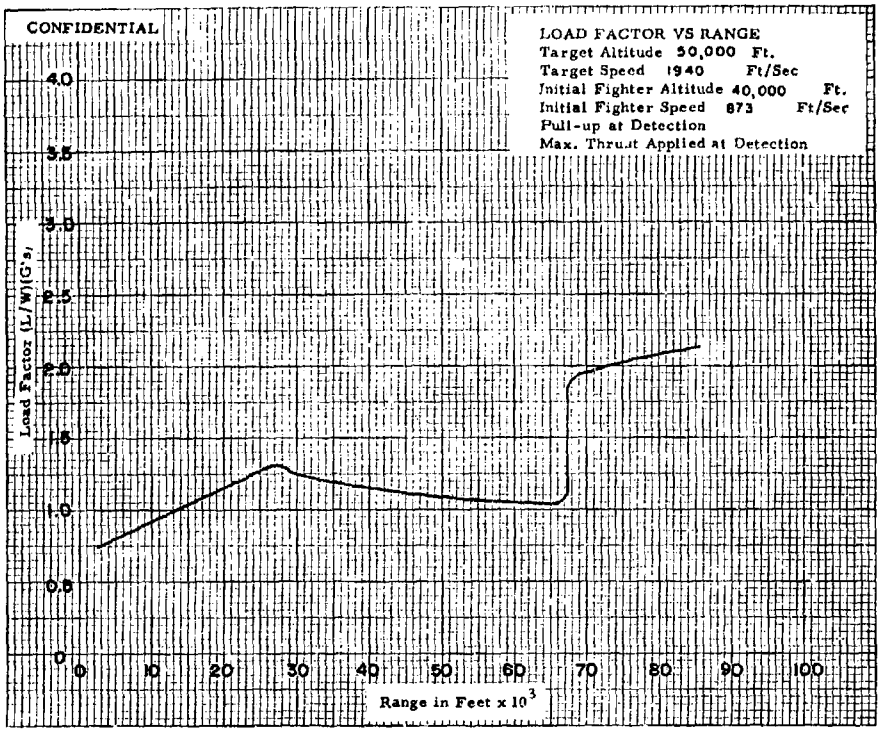


Figure 349


LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

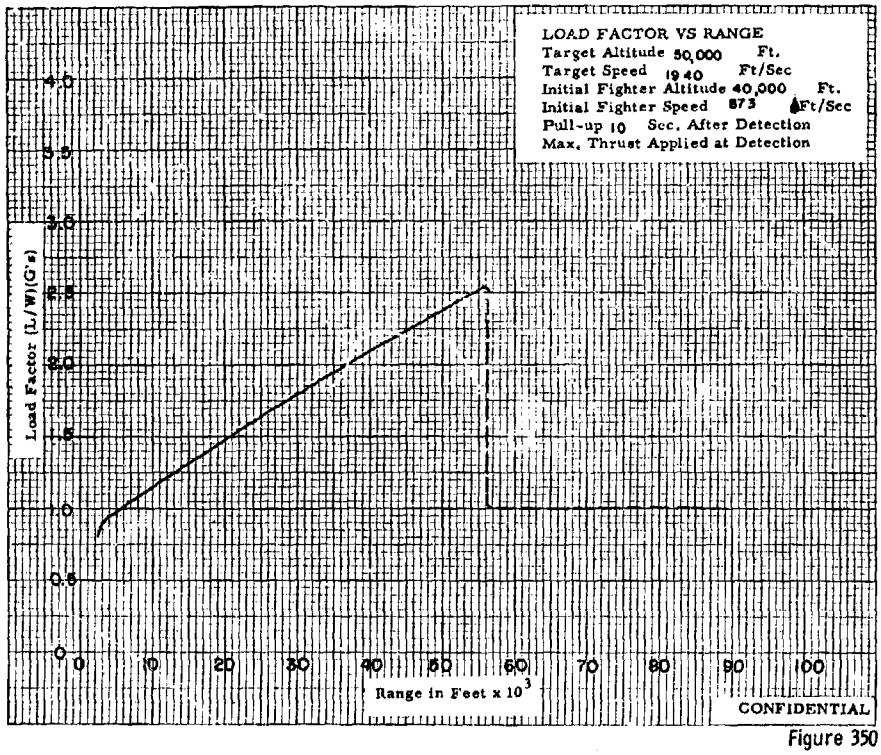
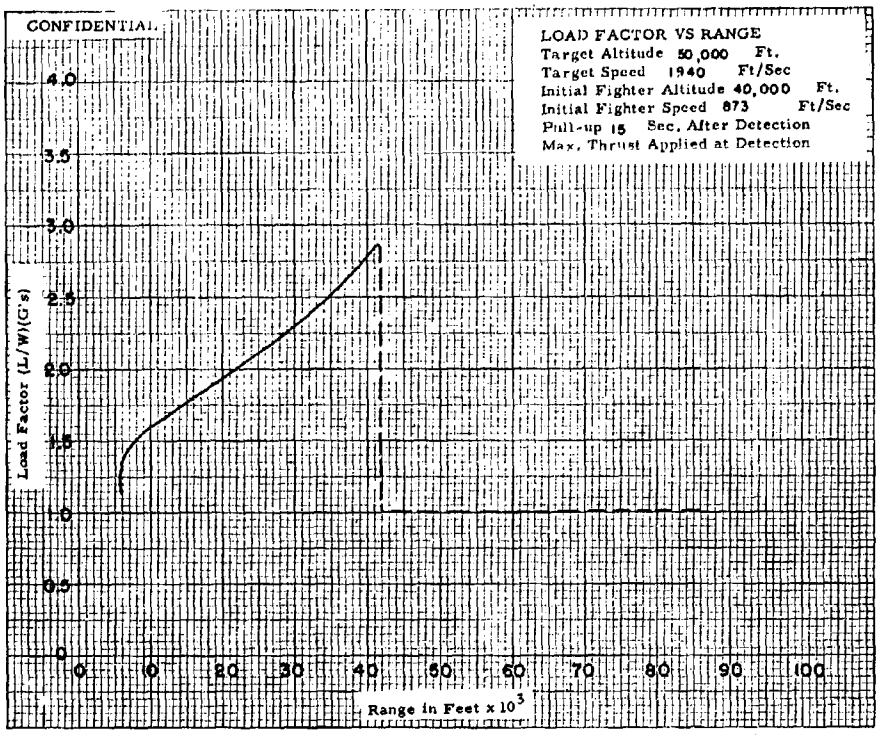

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 350


LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

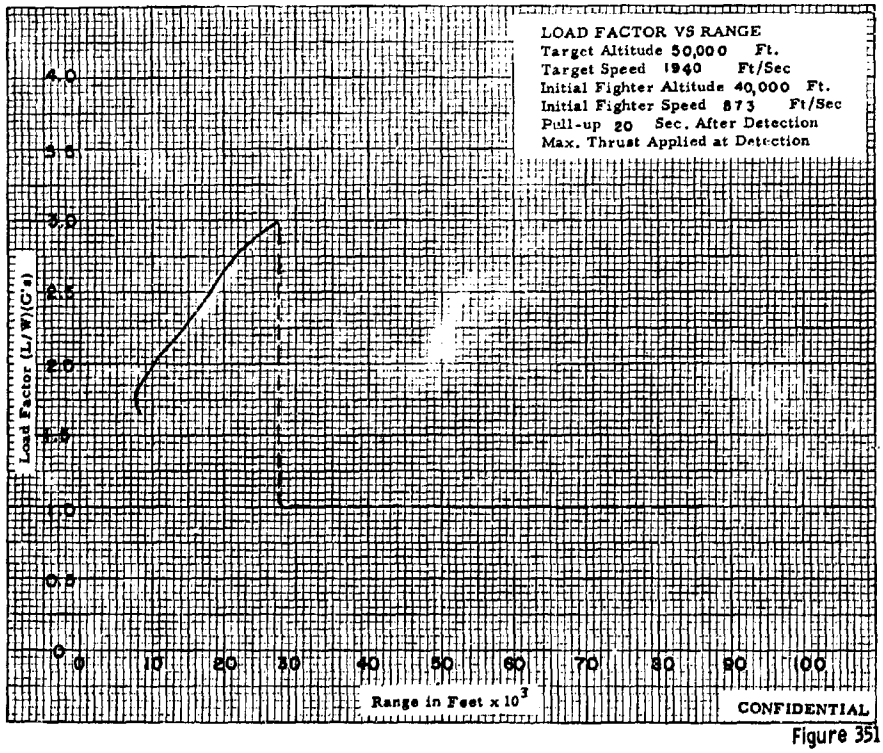

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

Figure 351

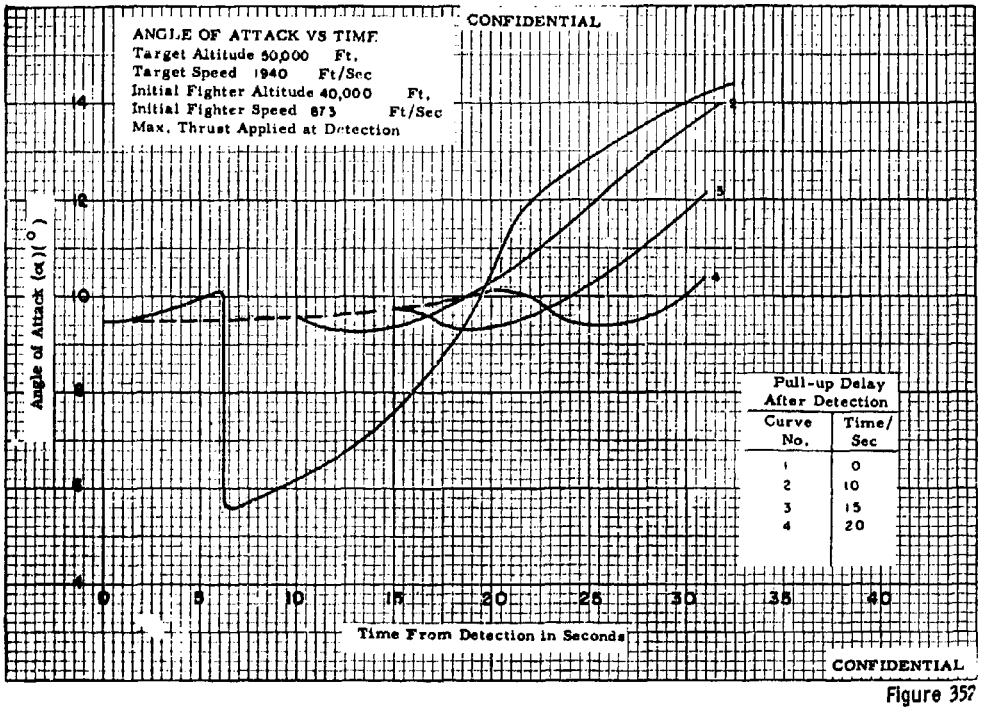


Figure 352

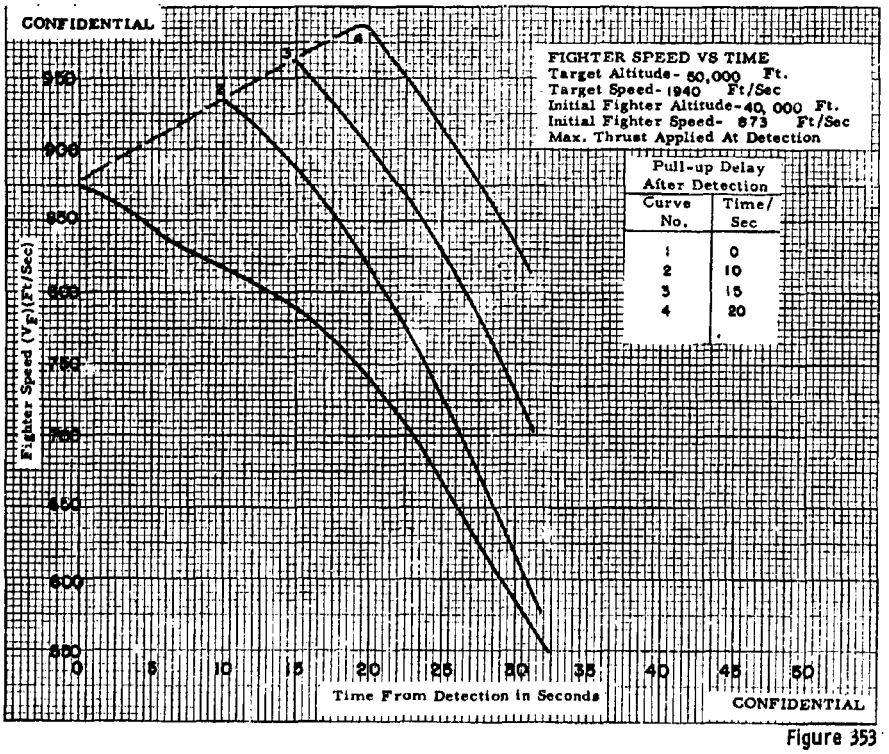
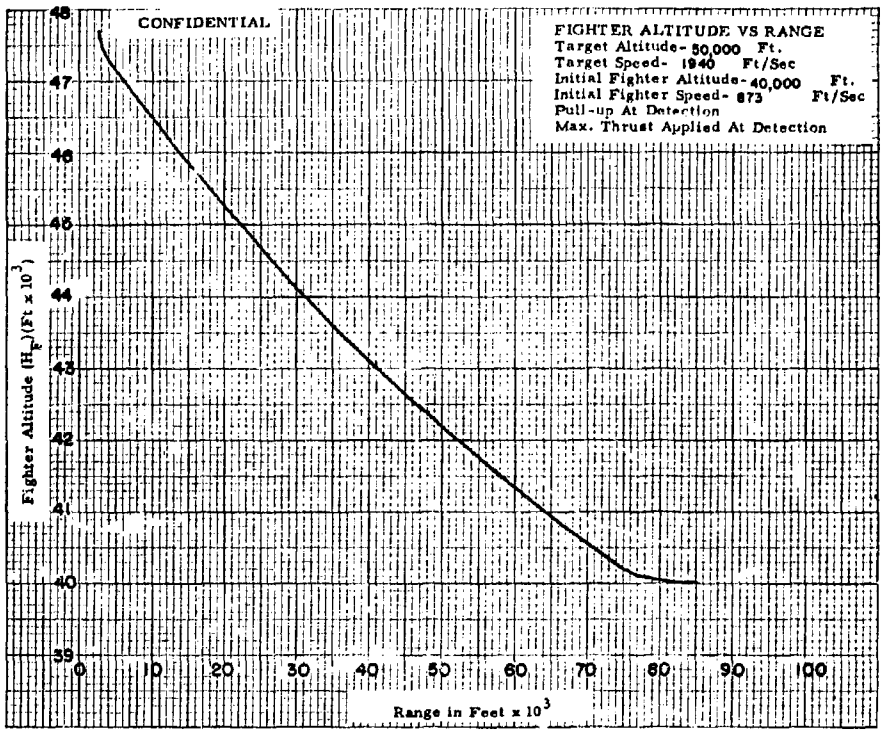


Figure 353


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude- 50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 40,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up At Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
48
47
46
45
44
43
42
41
40
39
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

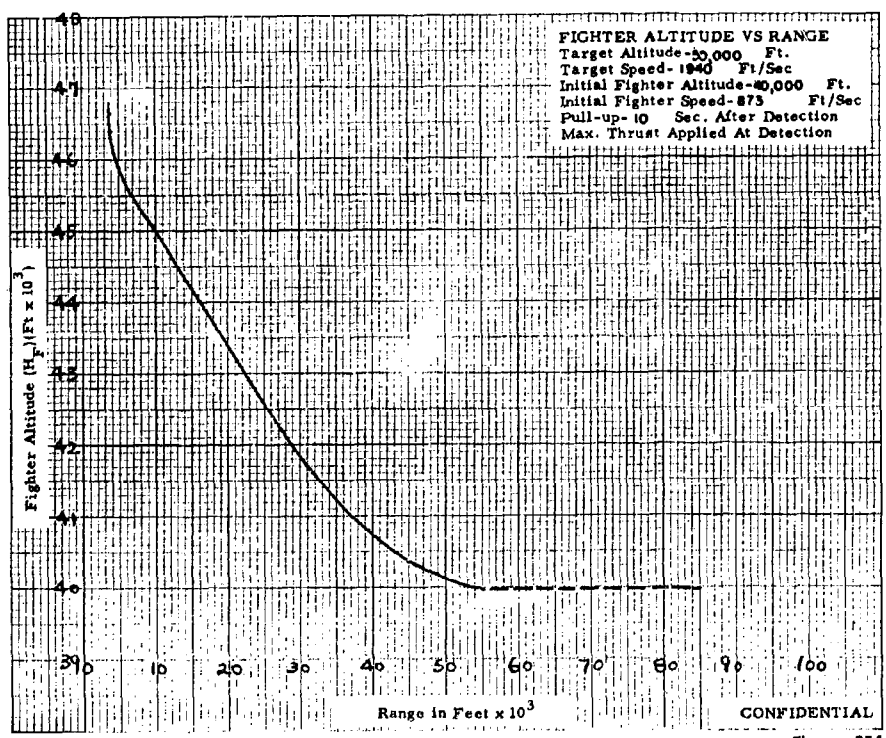
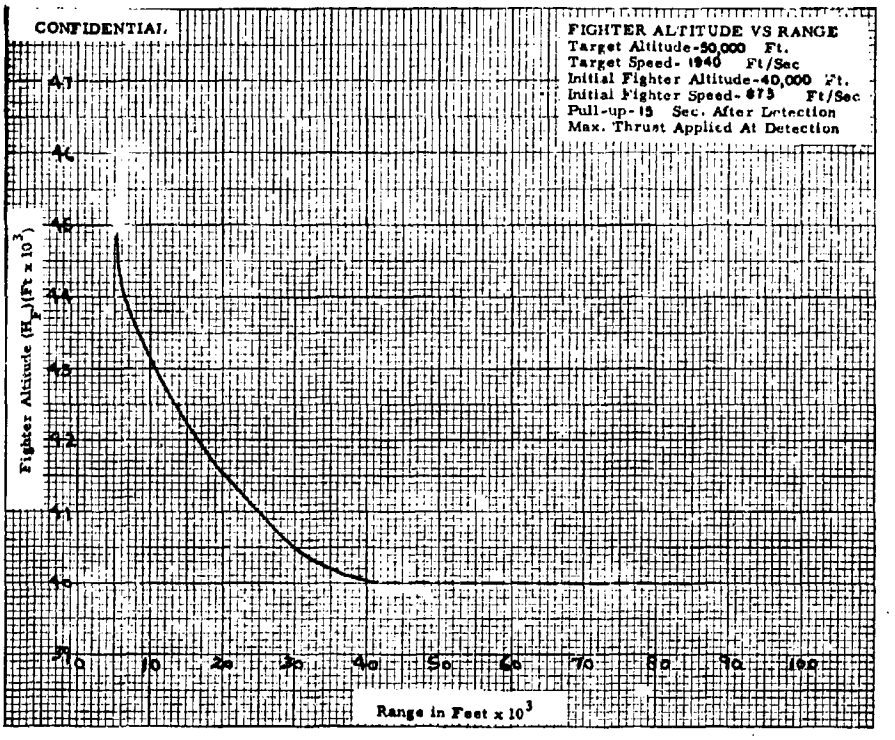

FIGHTER ALTITUDE VS RANGE
Target Altitude- 50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 40,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
48
47
46
45
44
43
42
41
40
39
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 354


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 15 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
47
46
45
44
43
42
41
40
39
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

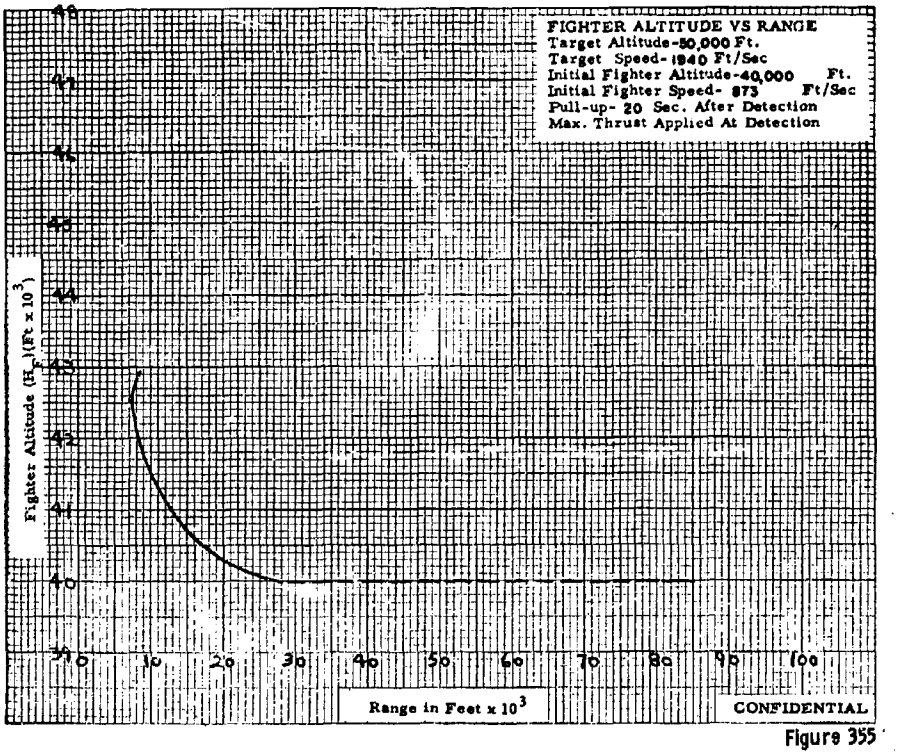
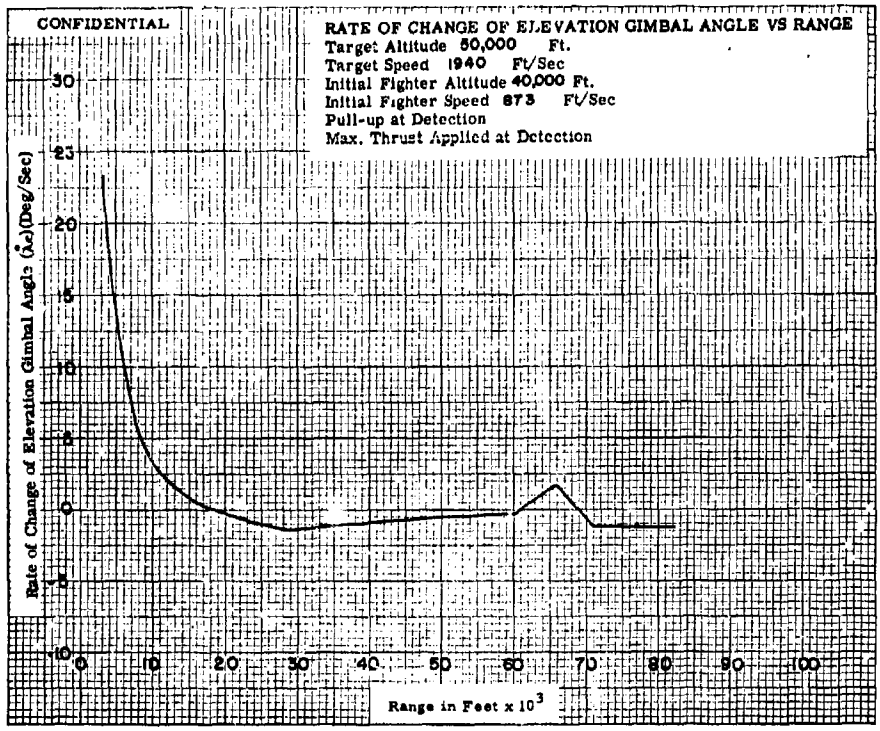

FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
47
46
45
44
43
42
41
40
39
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 355


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (Ȧe)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

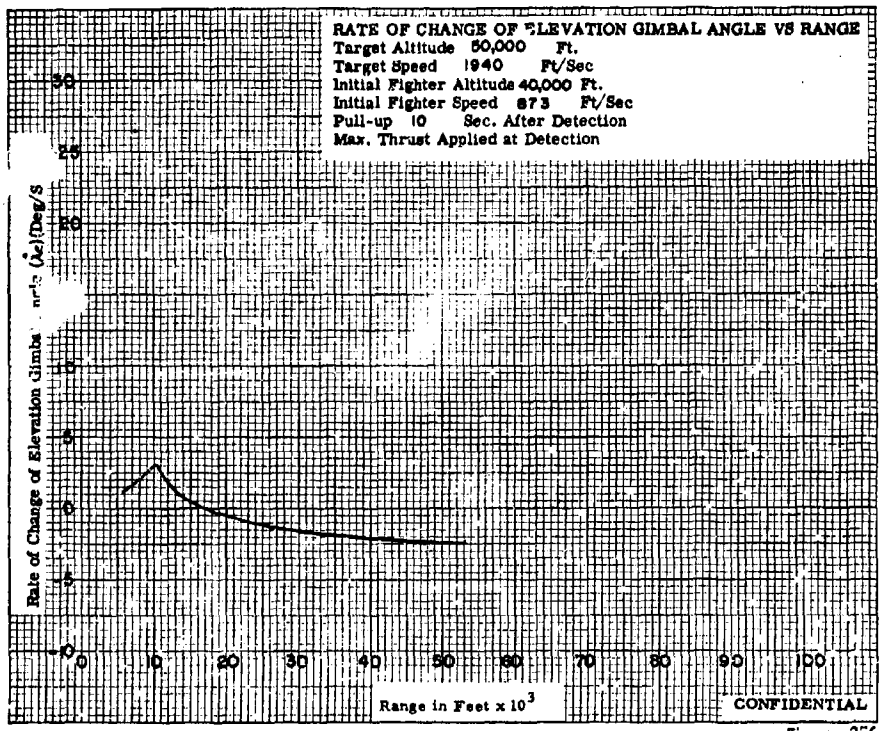
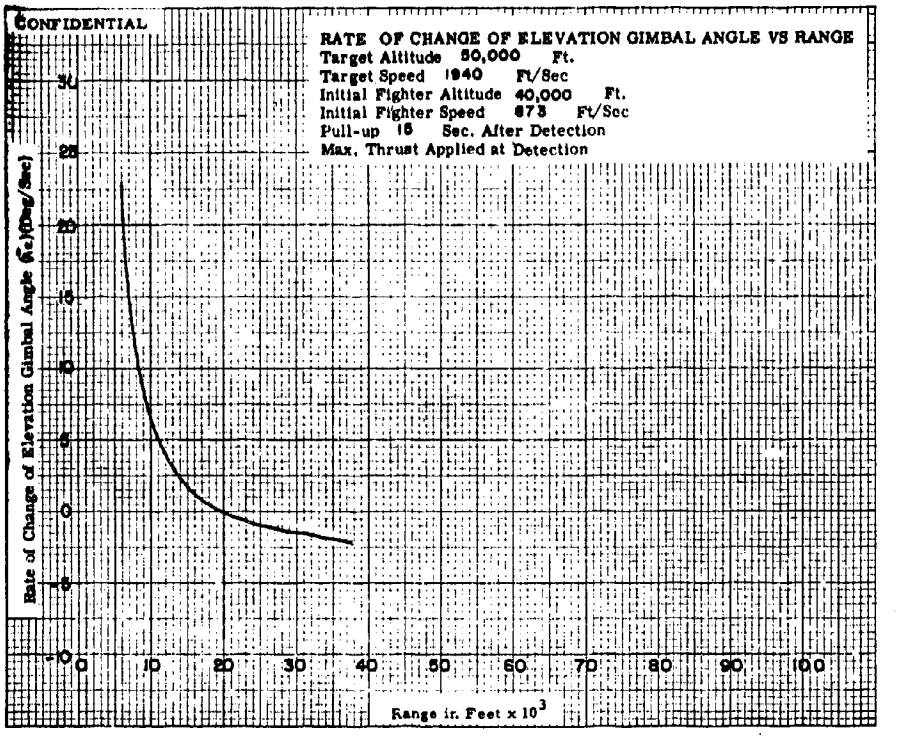

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (Ȧe)(Deg/S
30
25
20
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 356


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (Δe)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

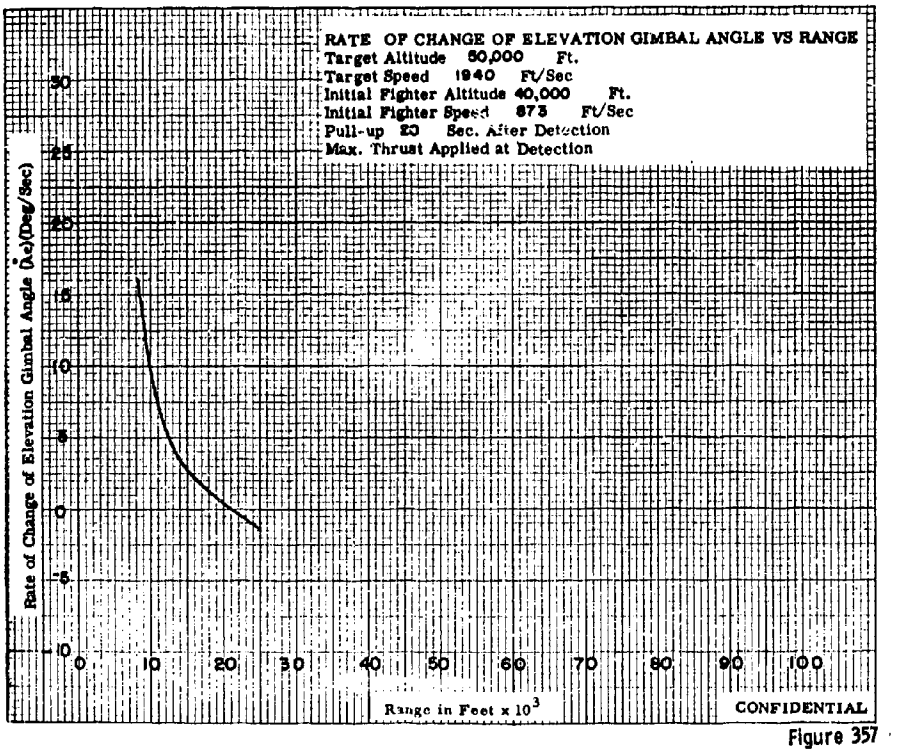
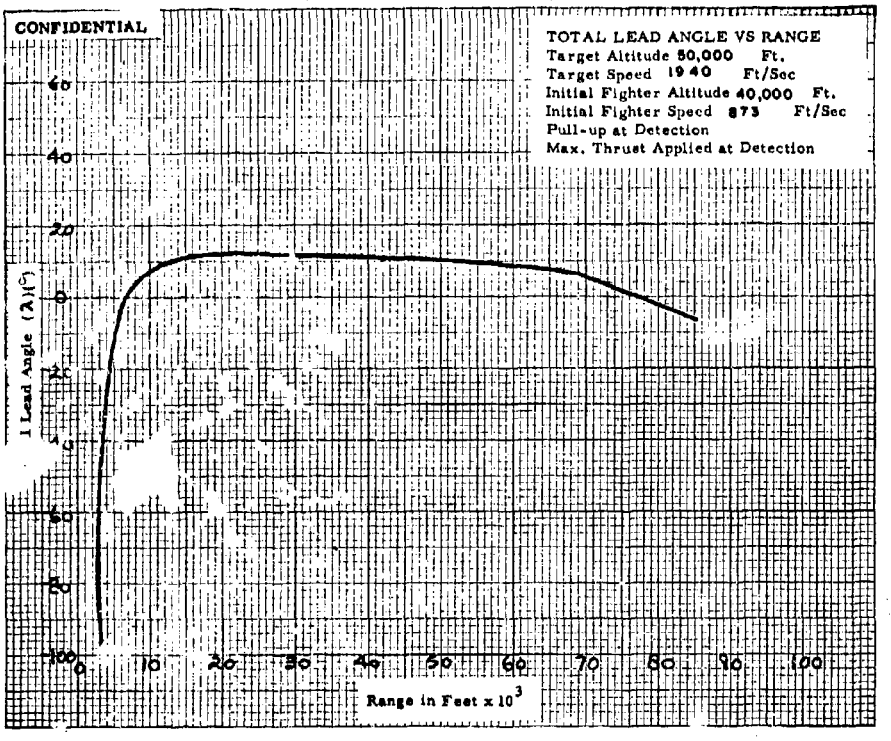

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (Δe)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 357


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
Range in Feet x 10^3

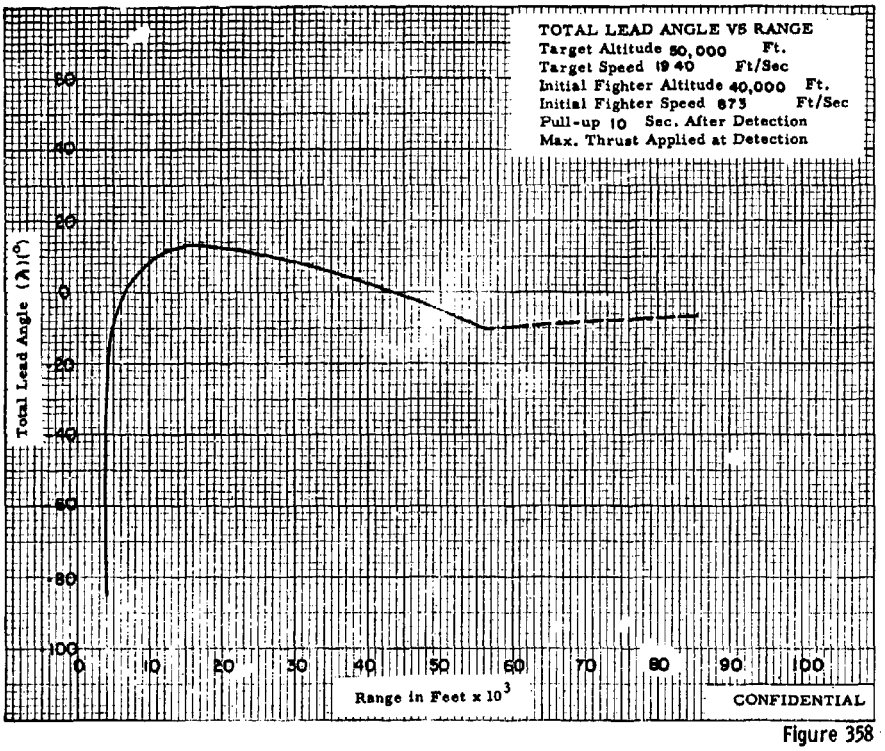
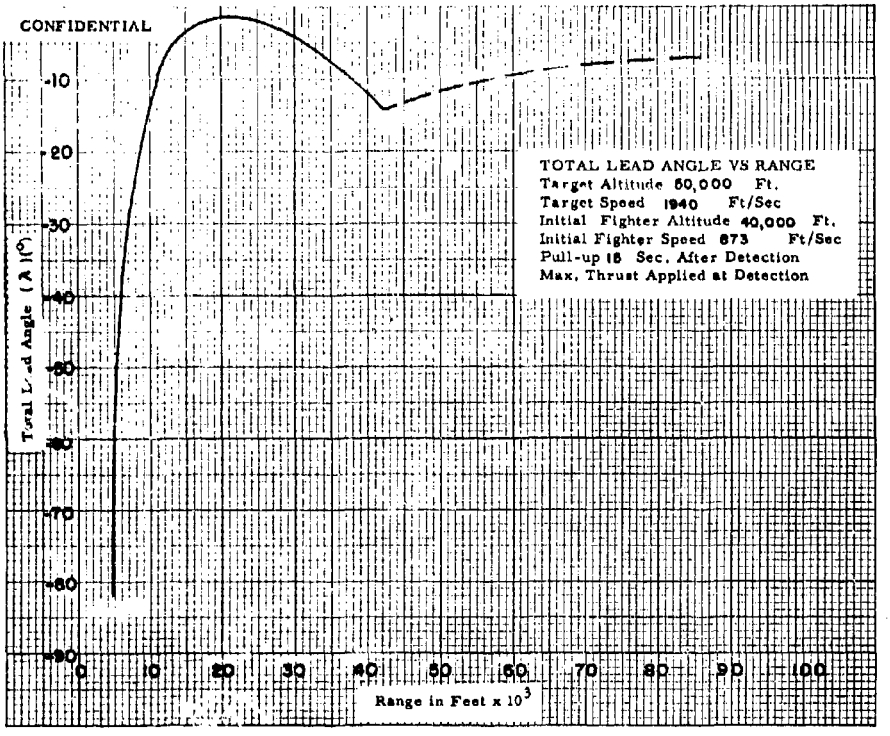

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
Range in Feet x 10^3
CONFIDENTIAL

Figure 358


TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (Δ1(°)
-10
-20
-30
-40
-50
-60
-70
-80
-90
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

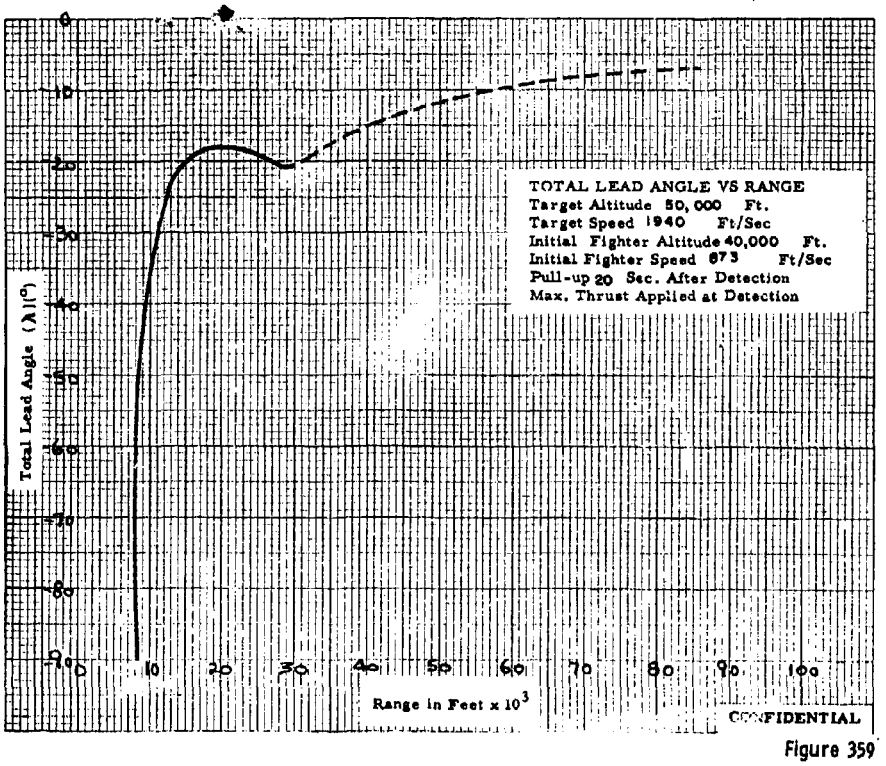
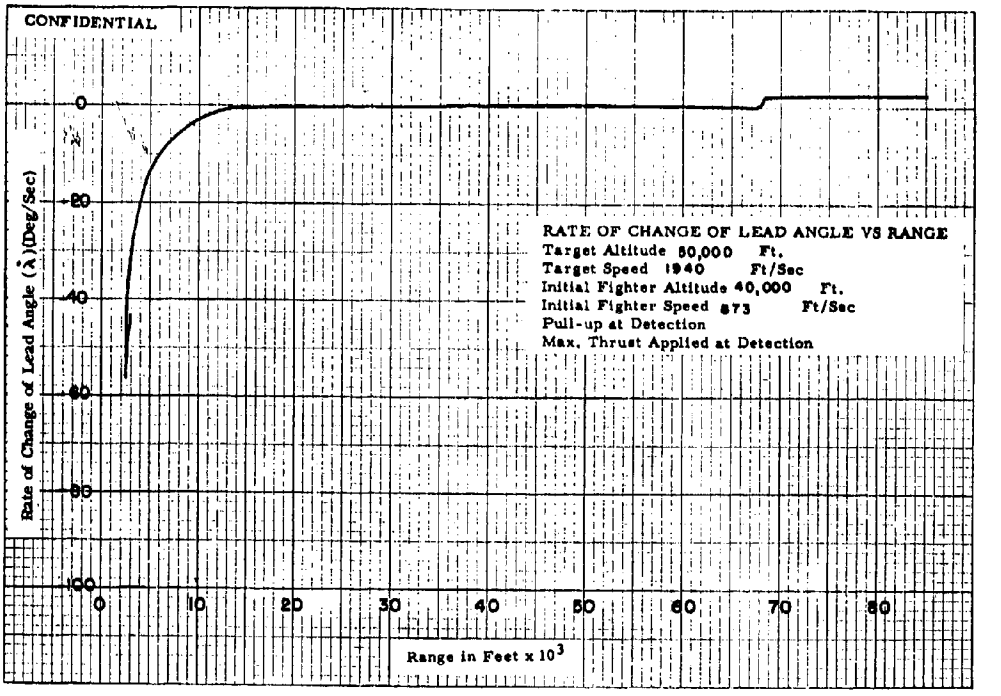

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (Δ1(°)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 359


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

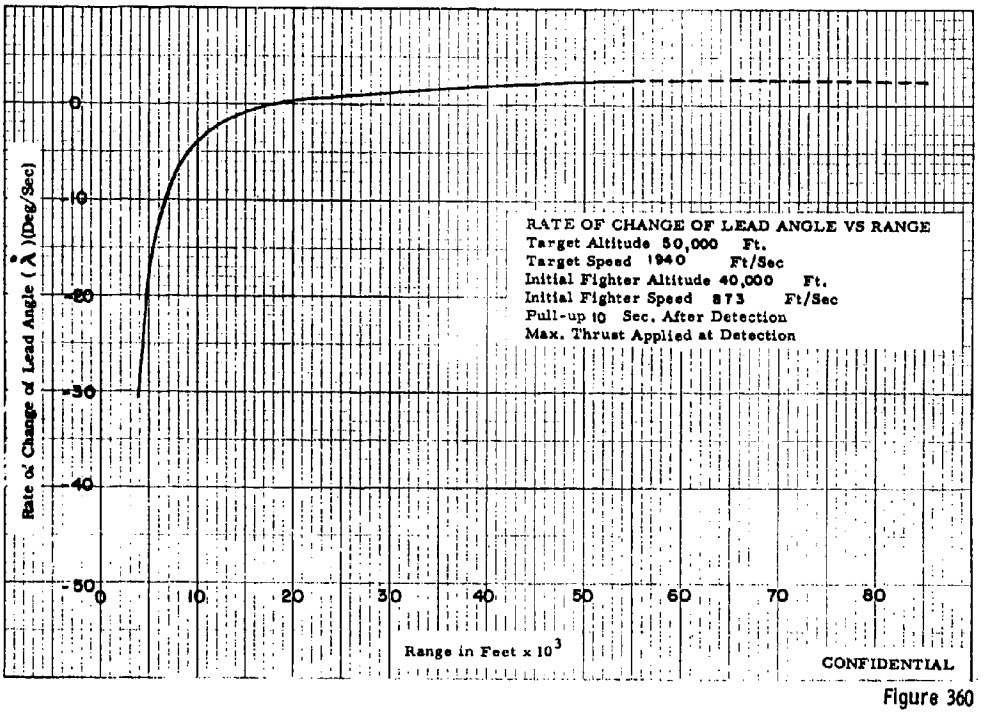
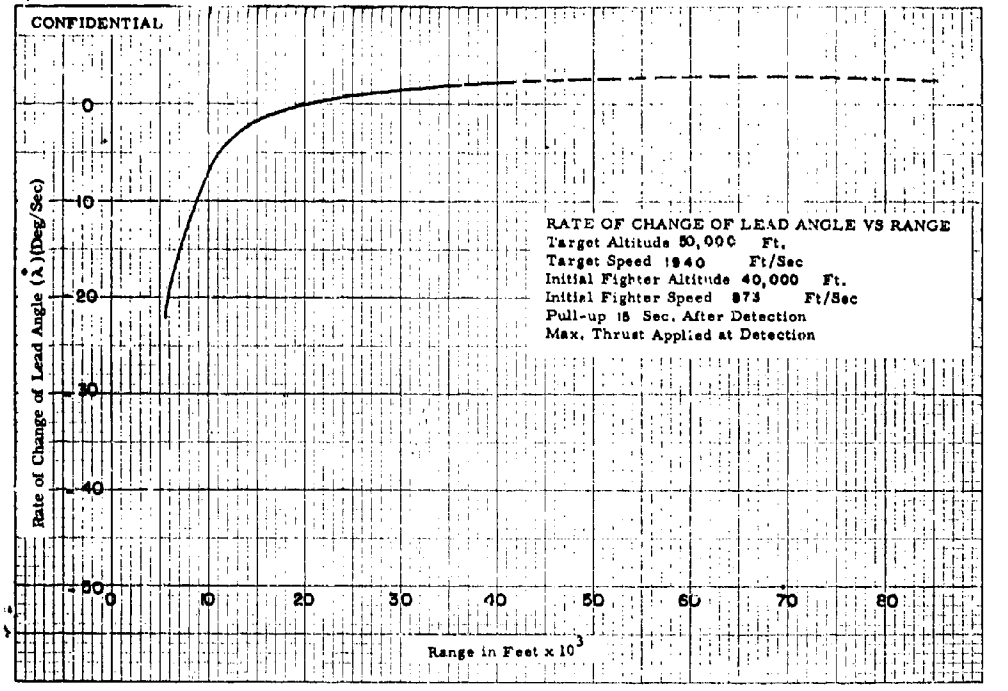

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 360


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

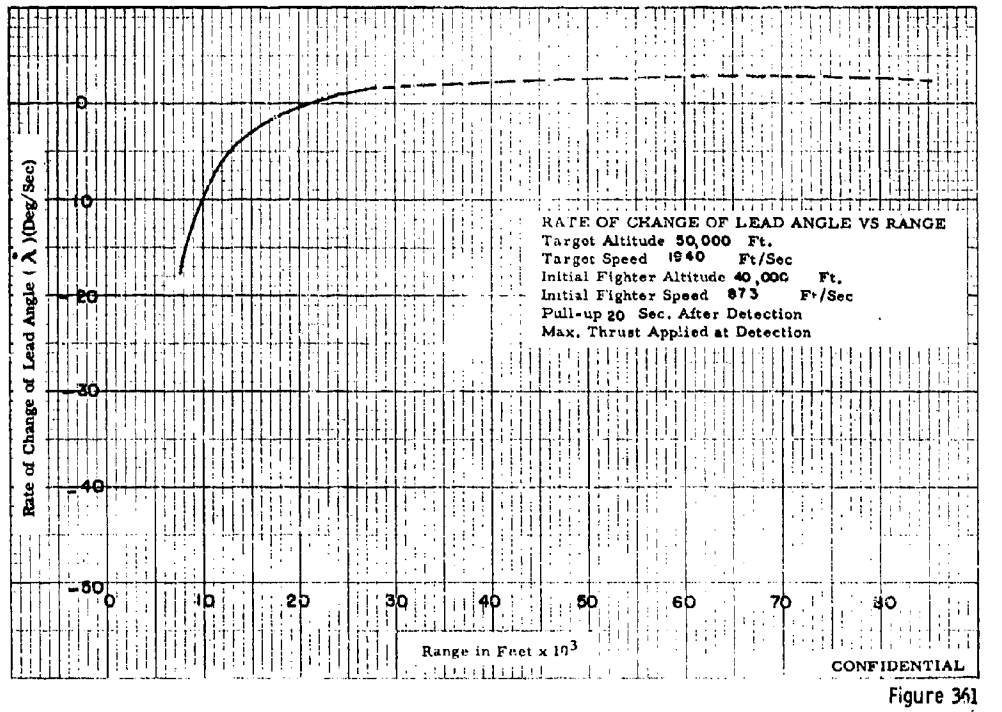
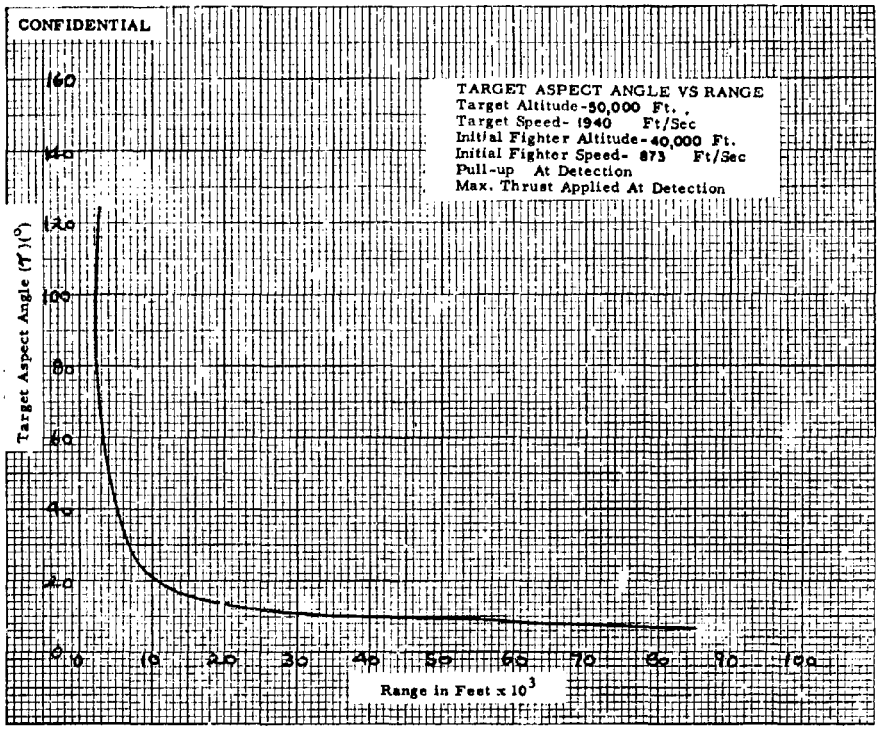

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

Figure 361


TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up At Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

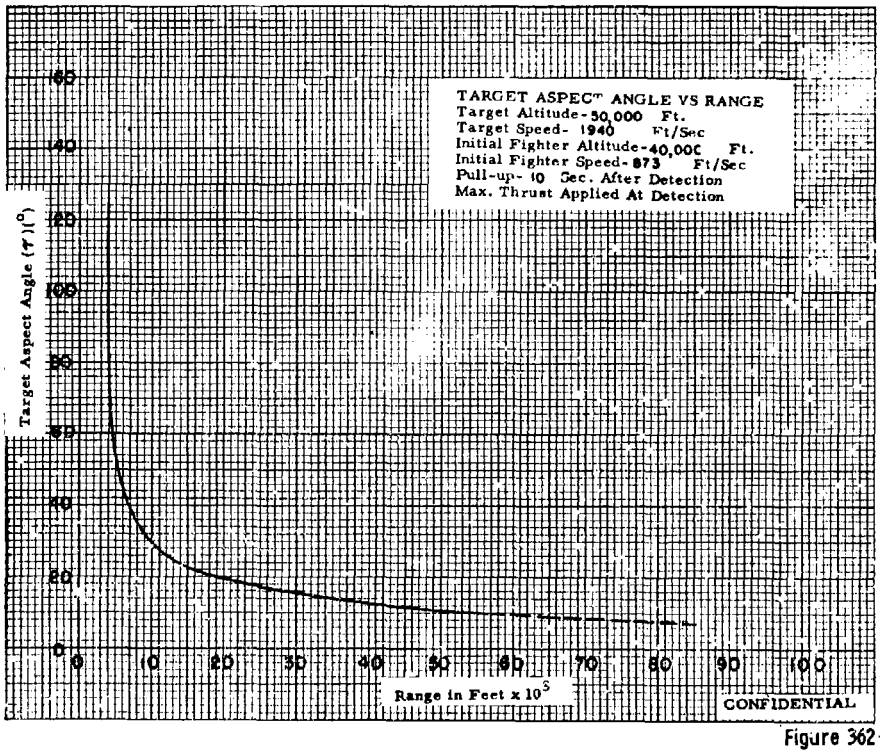
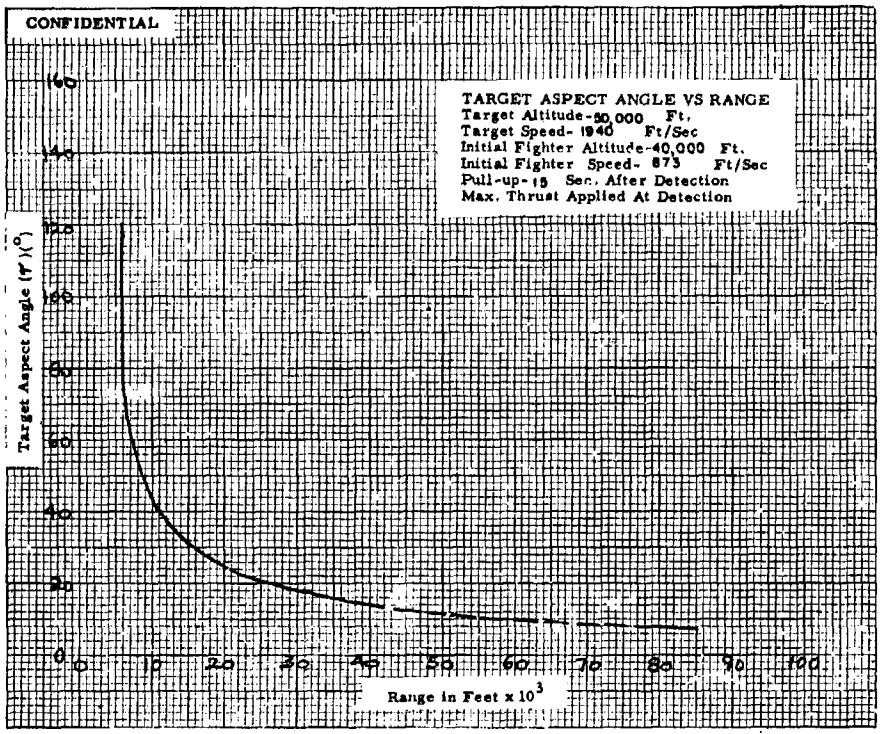

TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed-873 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 362


TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 15 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ψ)(°)
Range in Feet x 10^3

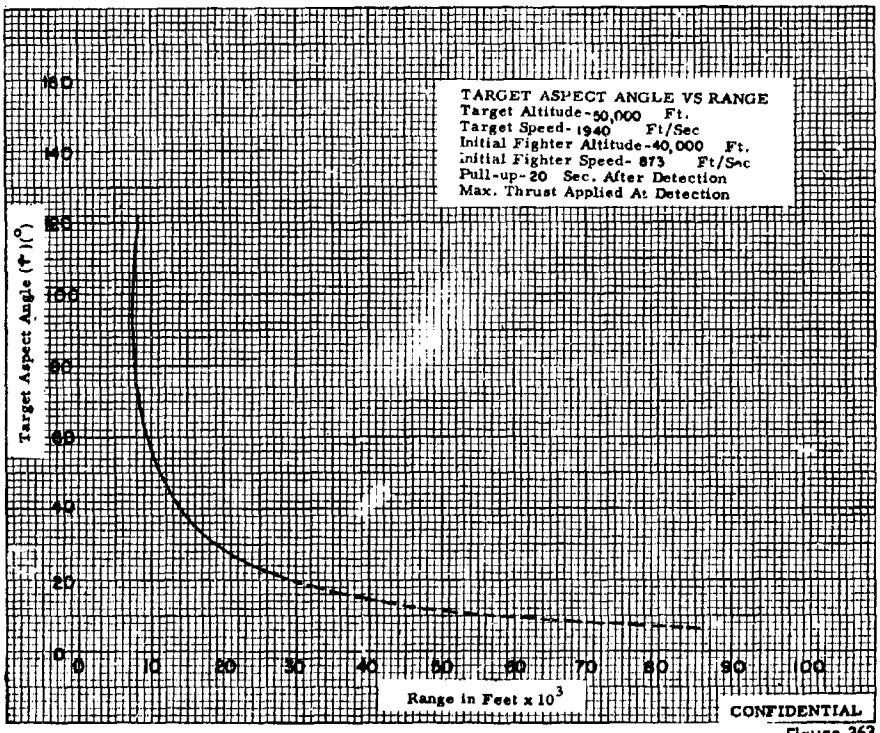
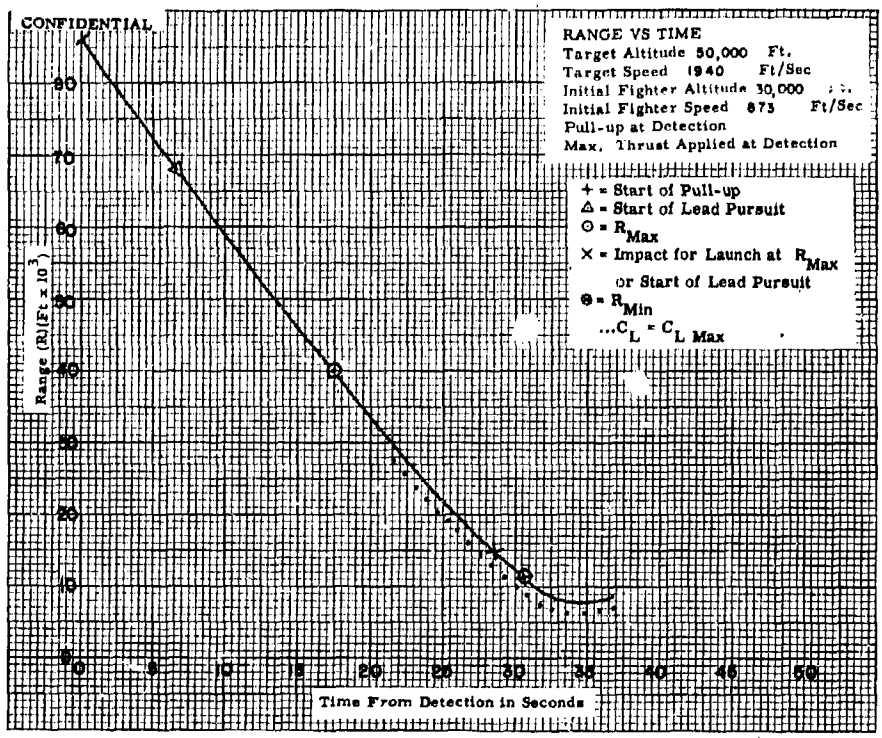

TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ψ)(°)
Range in Feet x 10^3

Figure 363


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
Δ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊛ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds

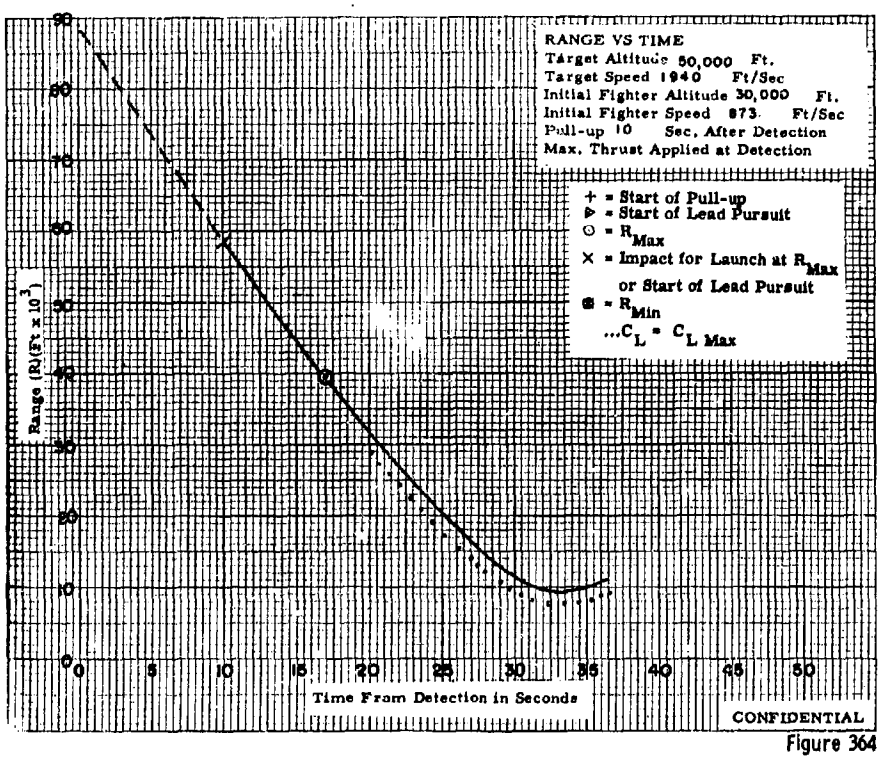
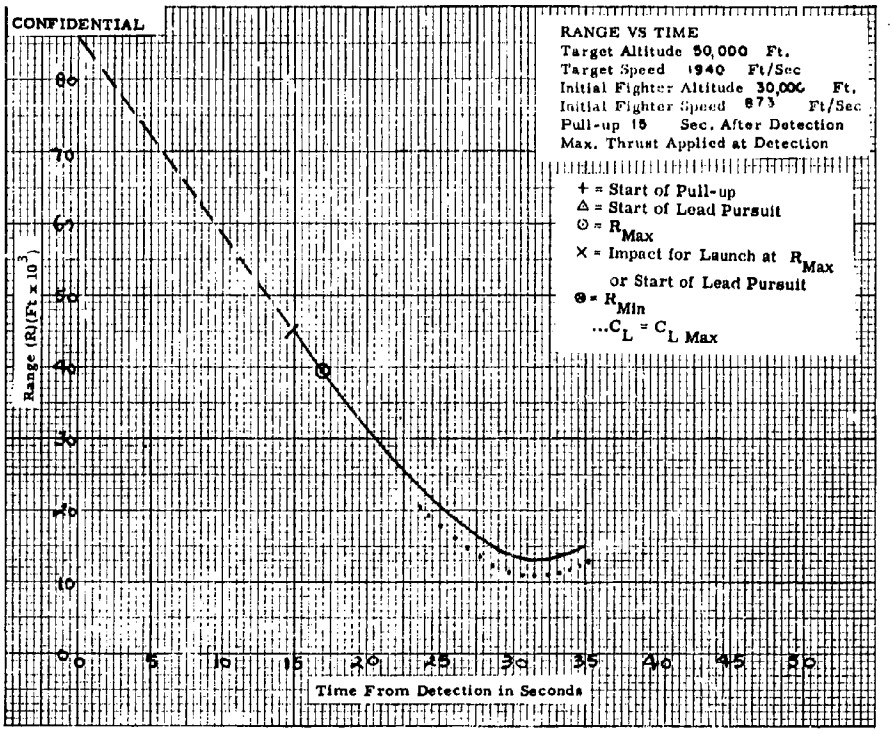

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊛ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 364


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
Δ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds

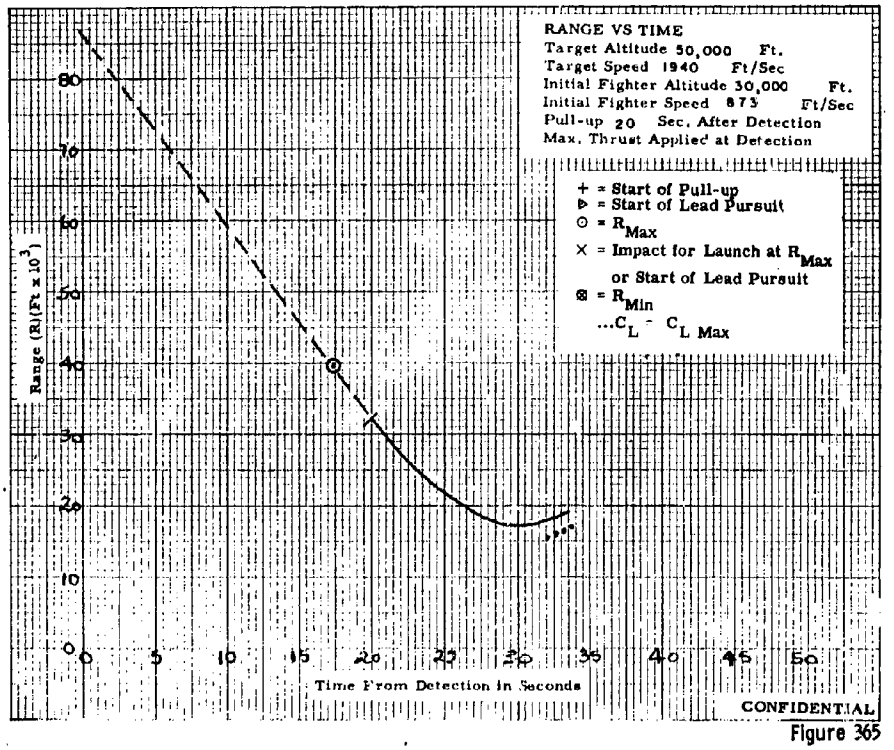
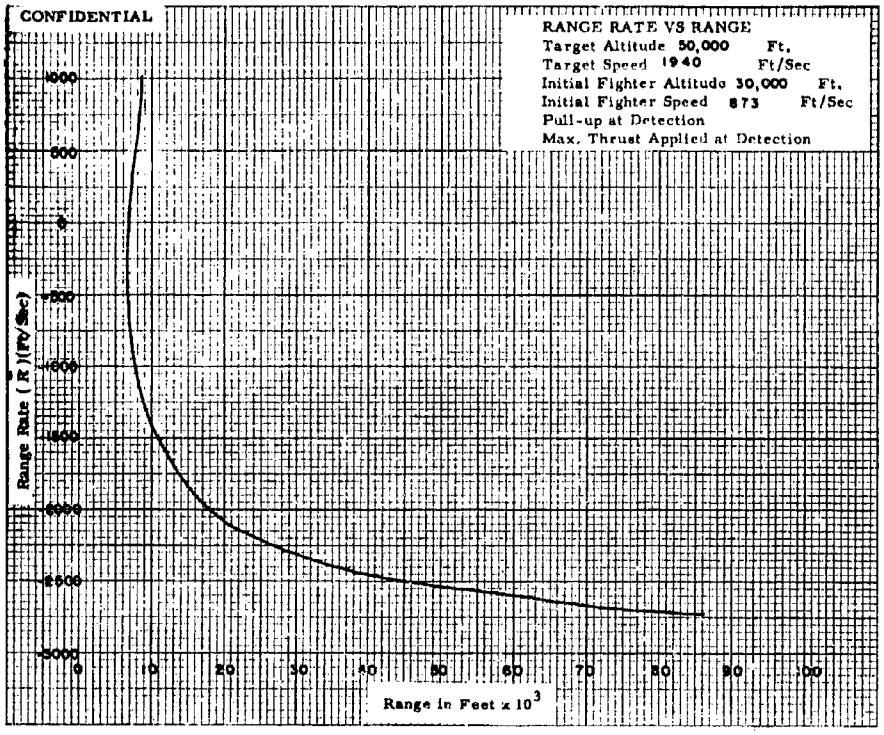

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 365


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

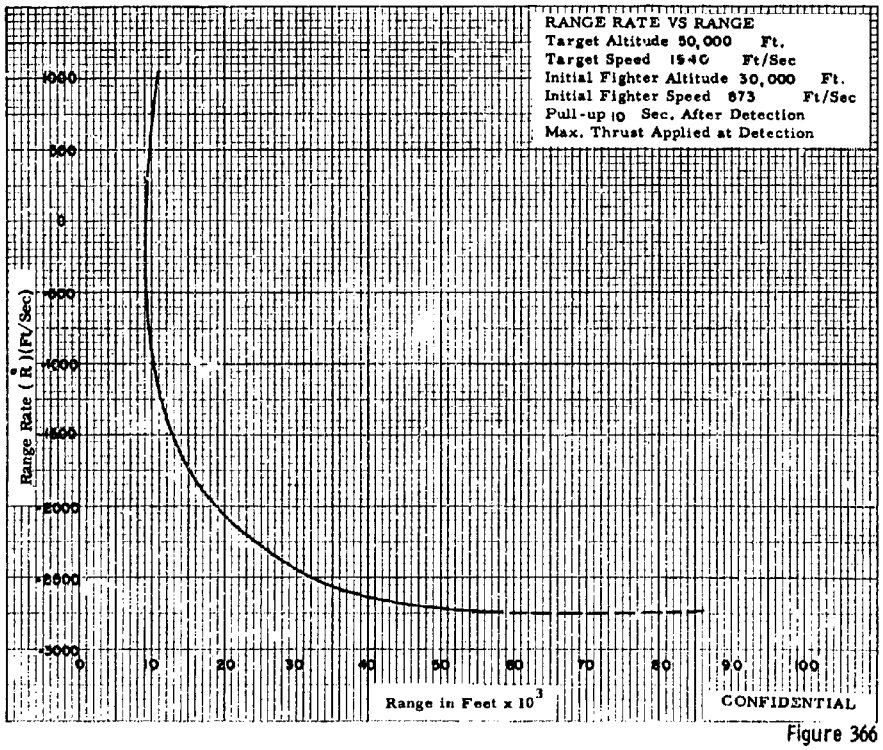
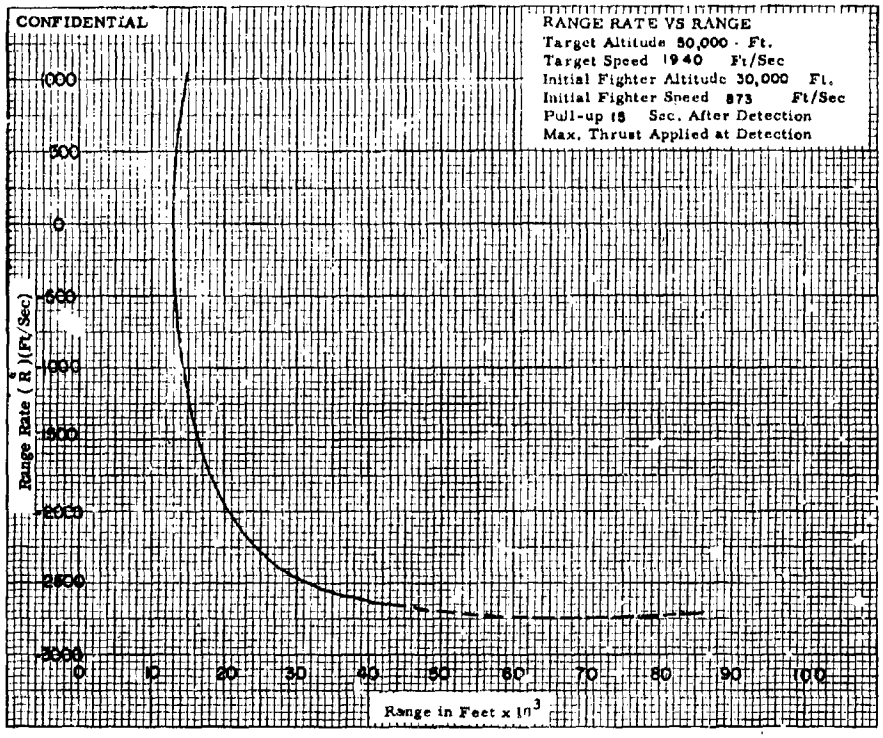

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 366


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 50,000 - Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate ($\dot{R}$) (Ft/Sec)
Range in Feet x 10^3

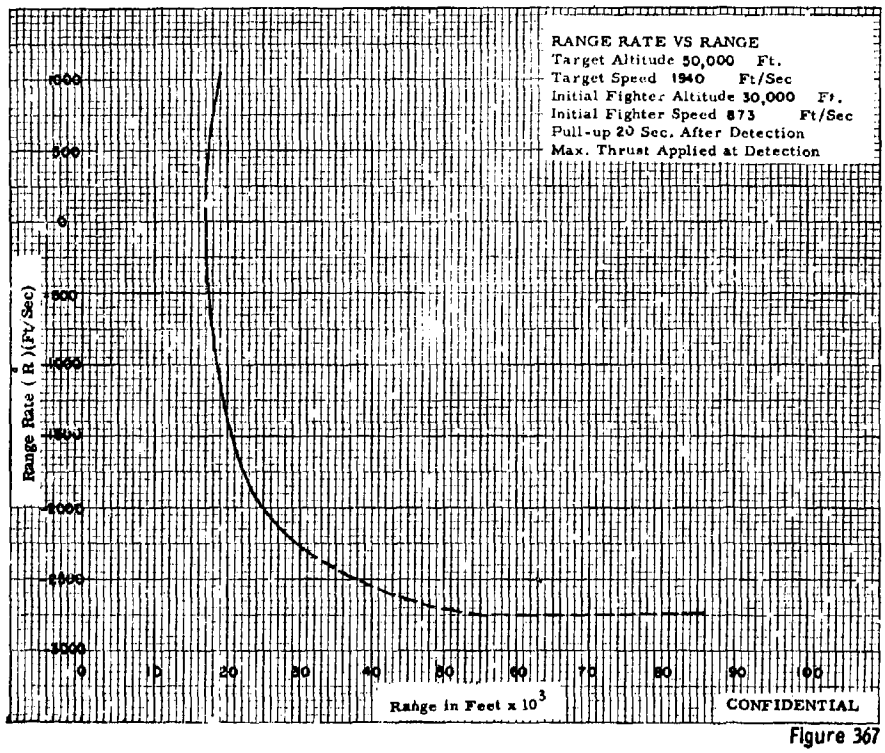
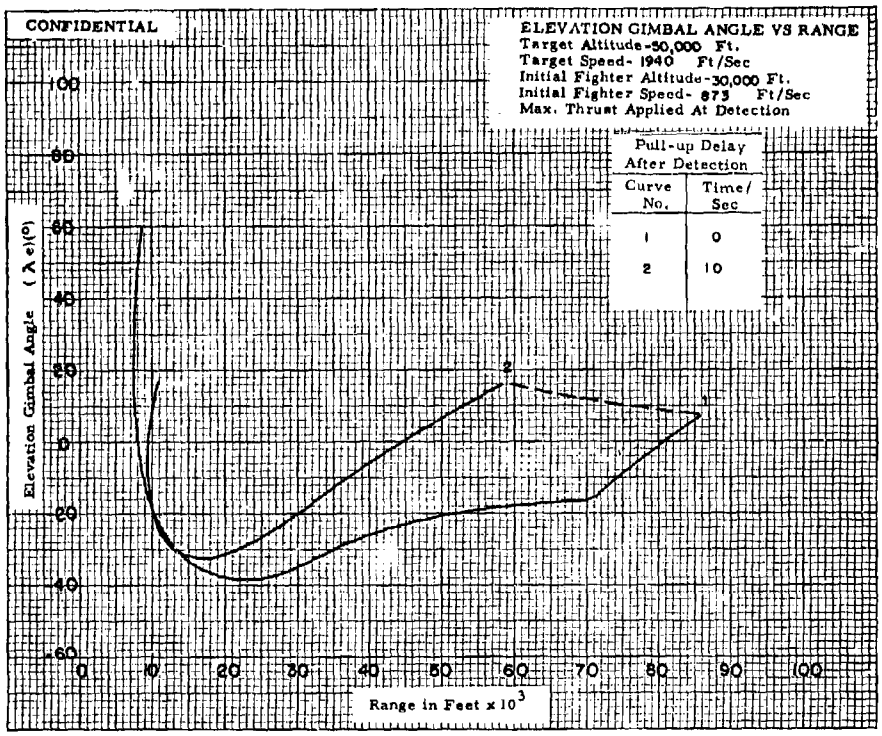

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate ($\dot{R}$) (Ft/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 367


CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No.
Time/ Sec
1
0
2
10
Elevation Gimbal Angle (λe)(°)
Range in Feet x 10^3

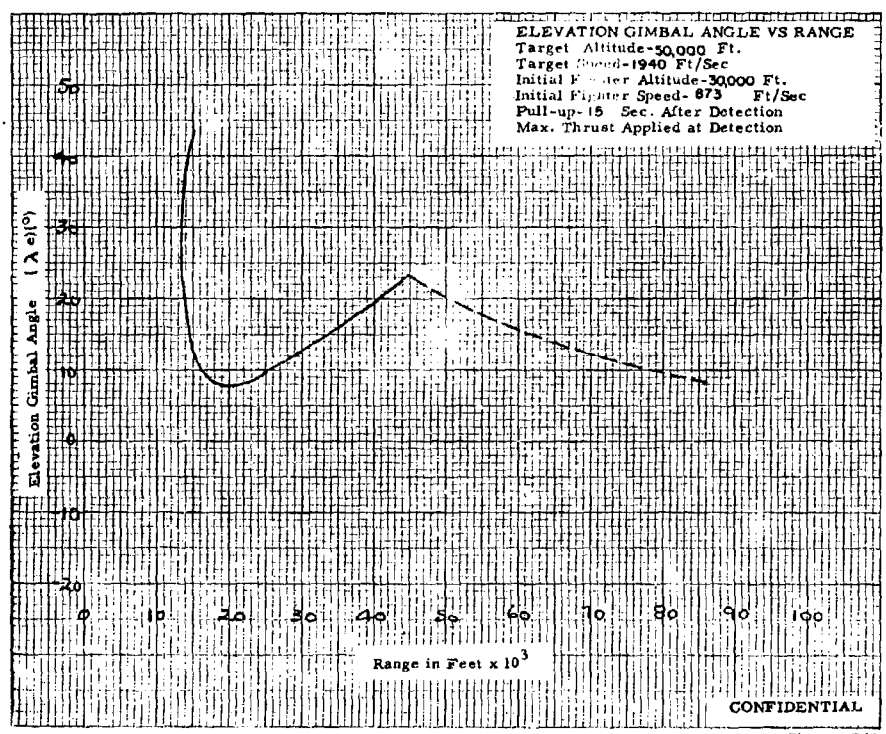

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 15 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Gimbal Angle (λe)(°)
Range in Feet x 10^3
CONFIDENTIAL

Figure 368

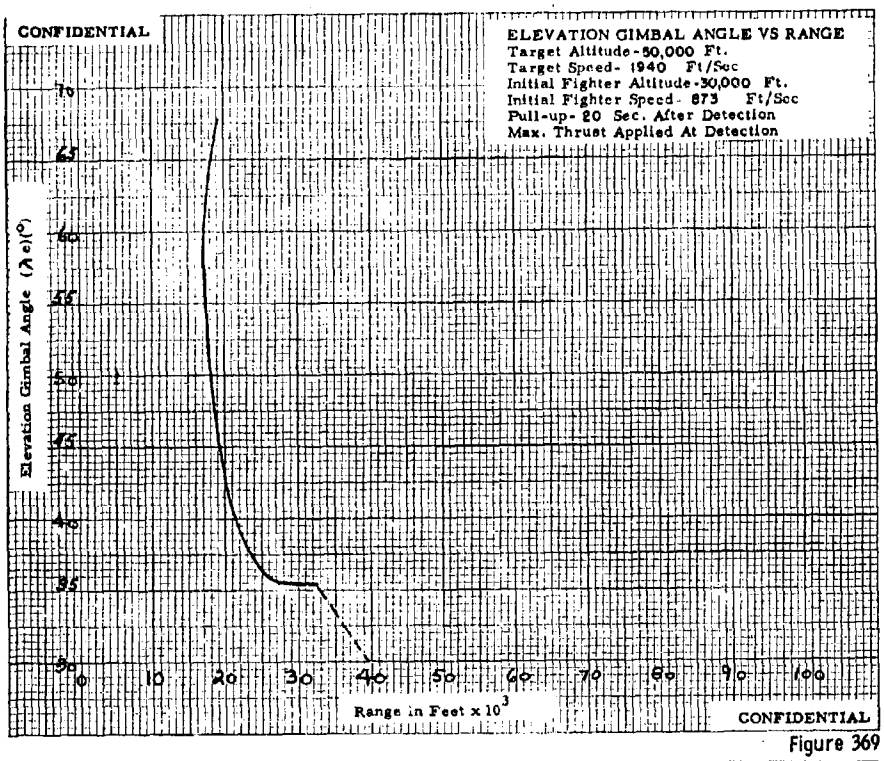


Figure 369

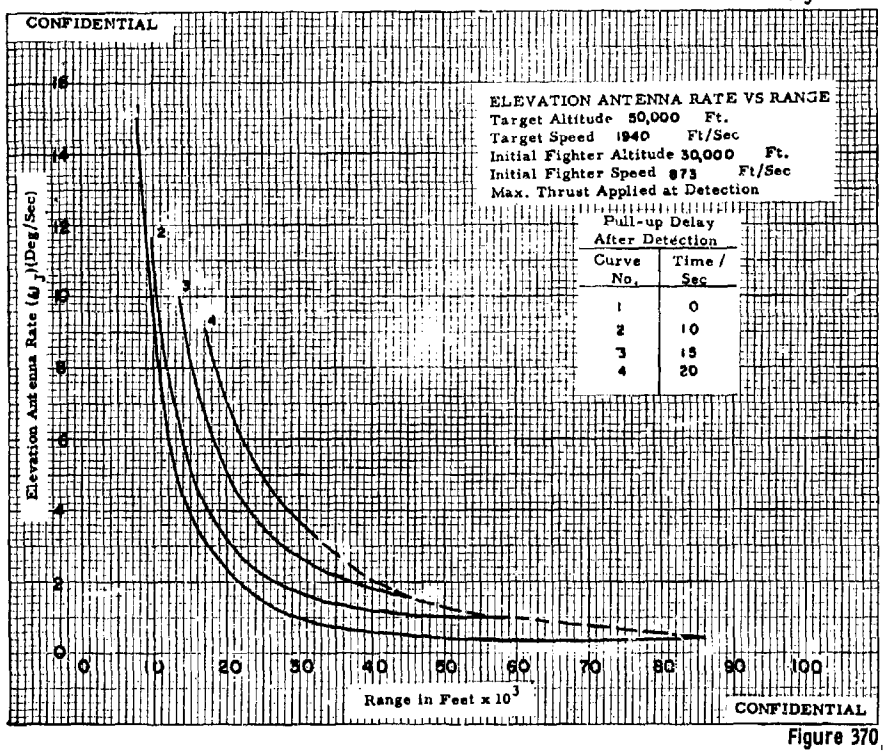


Figure 370

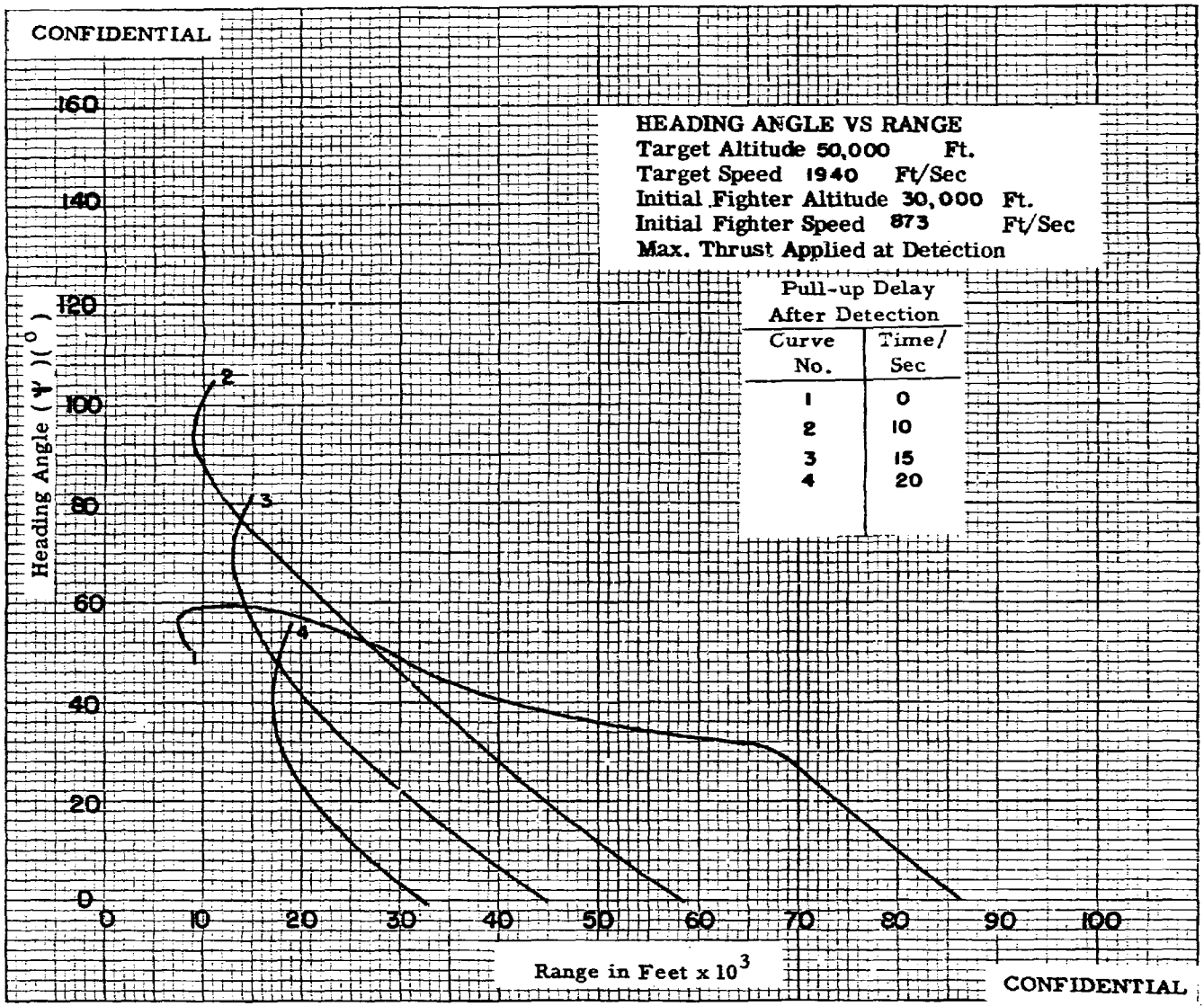
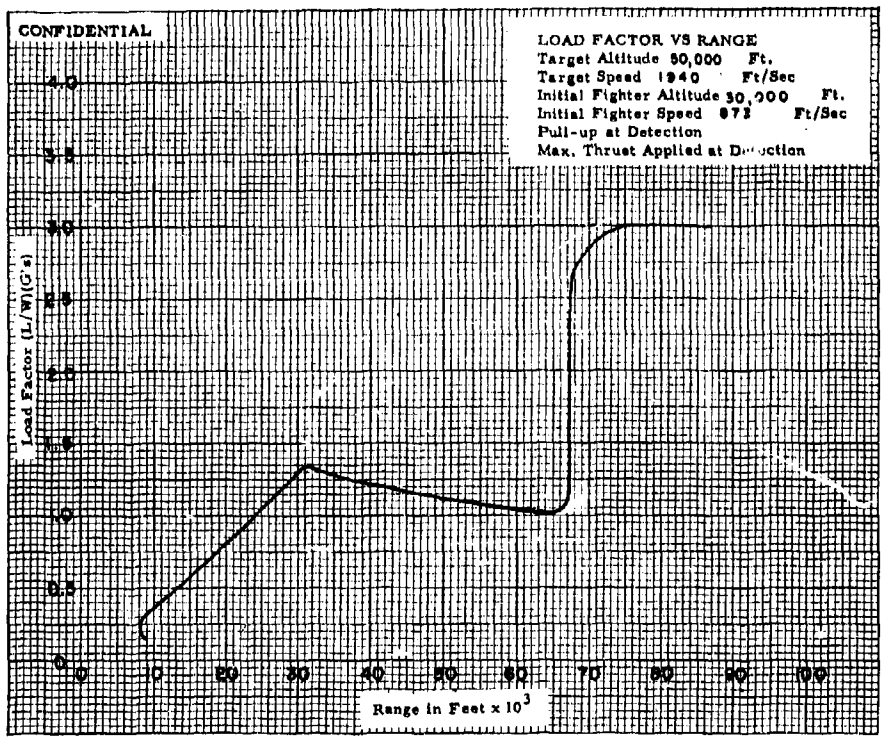

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 15
4 | 20
Heading Angle (ψ) (°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 371


LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

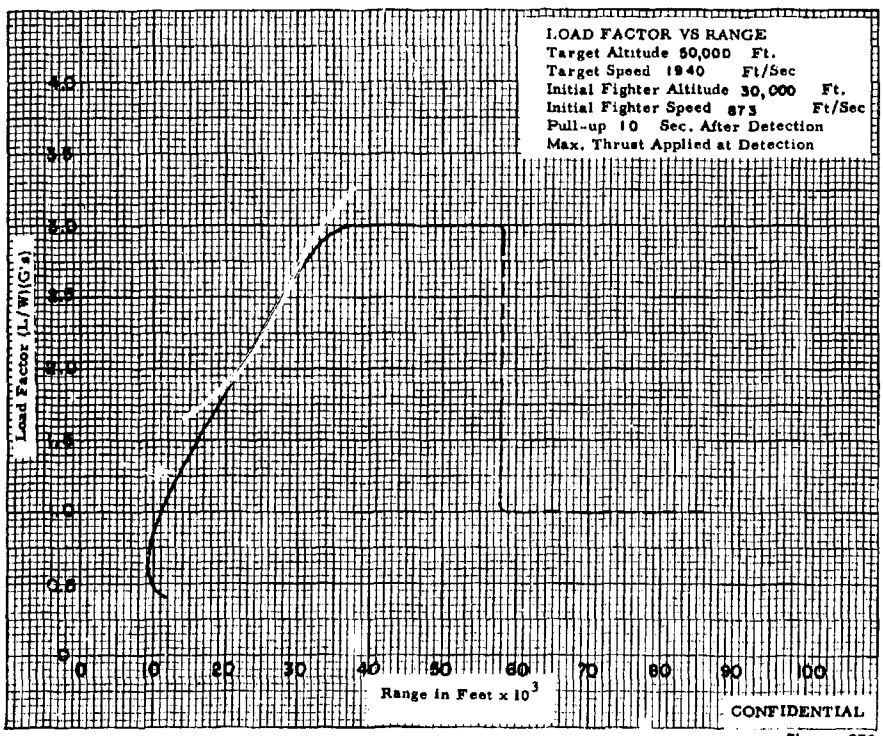
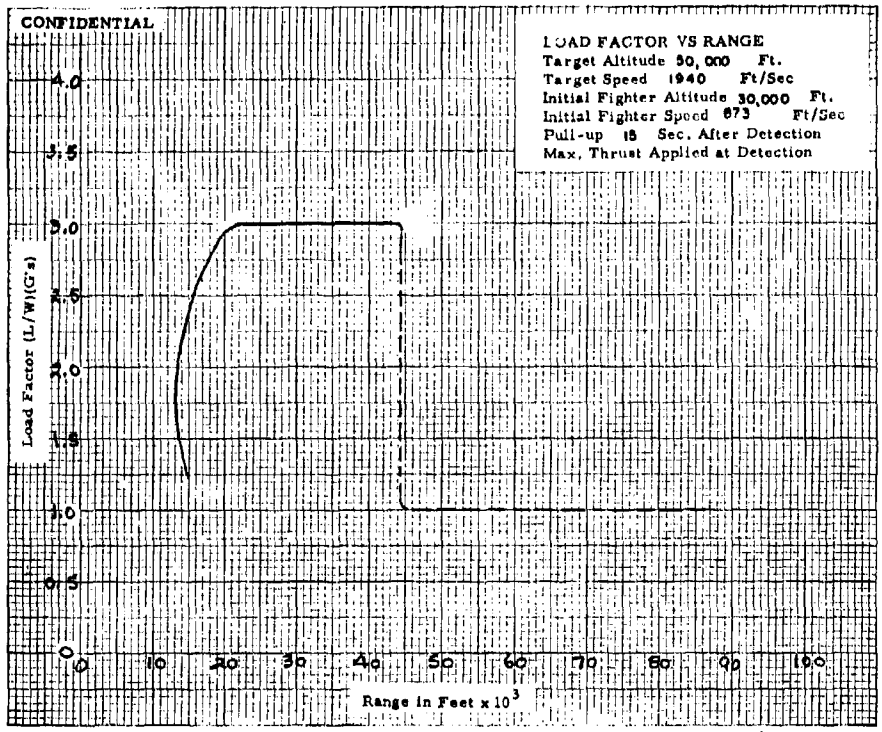

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

Figure 372


LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

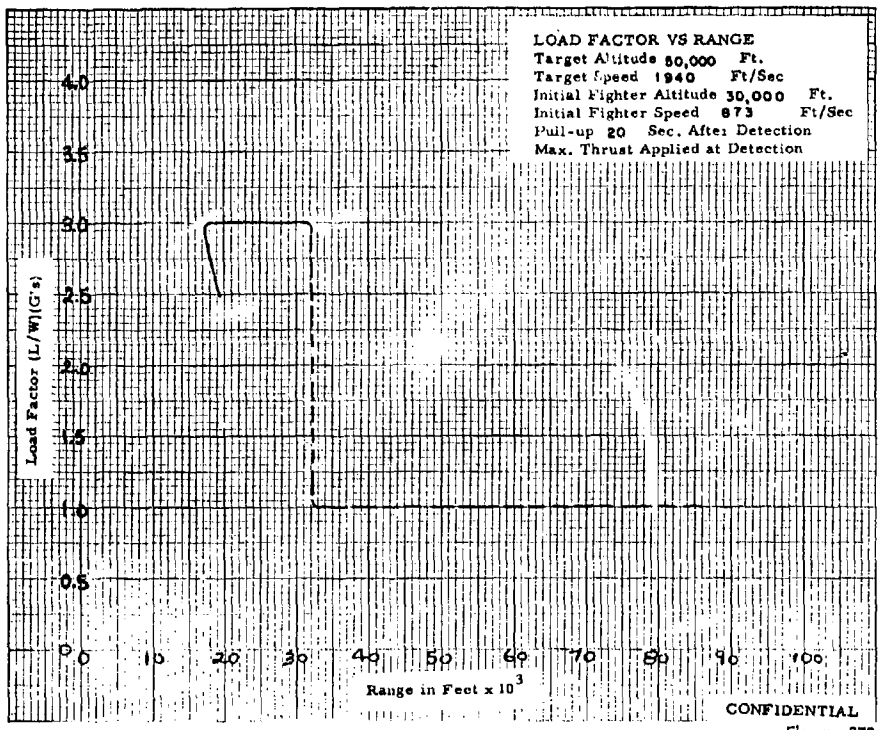

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

Figure 373

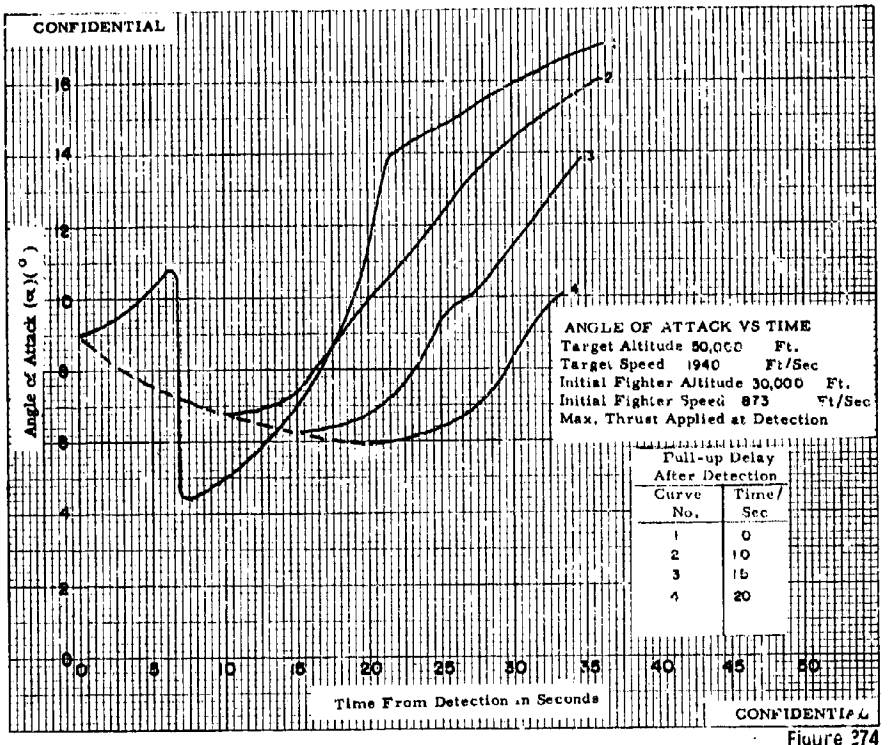


Figure 374

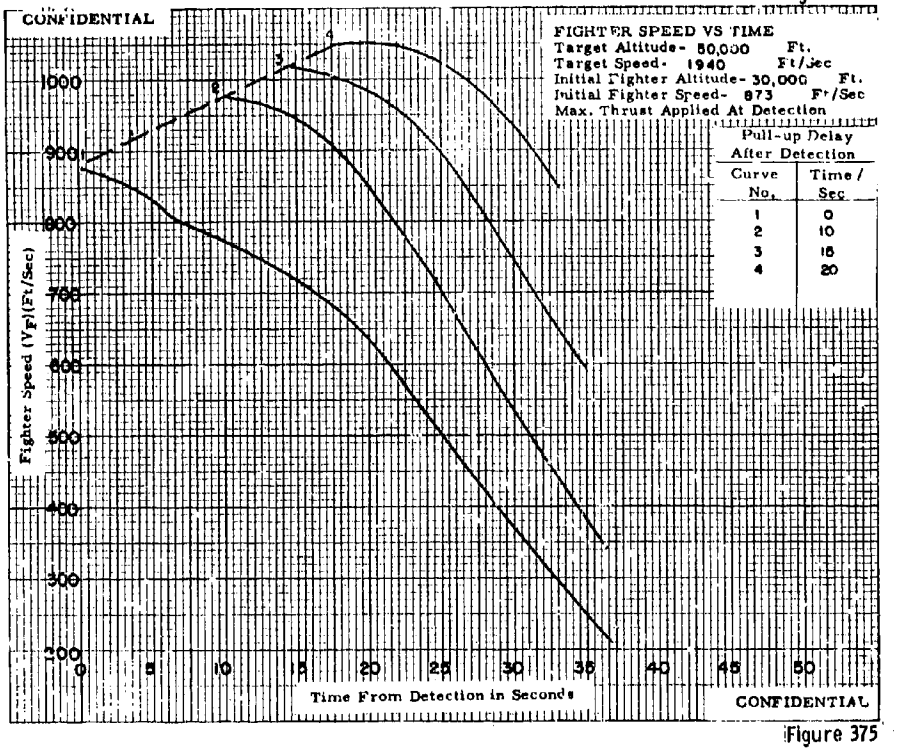
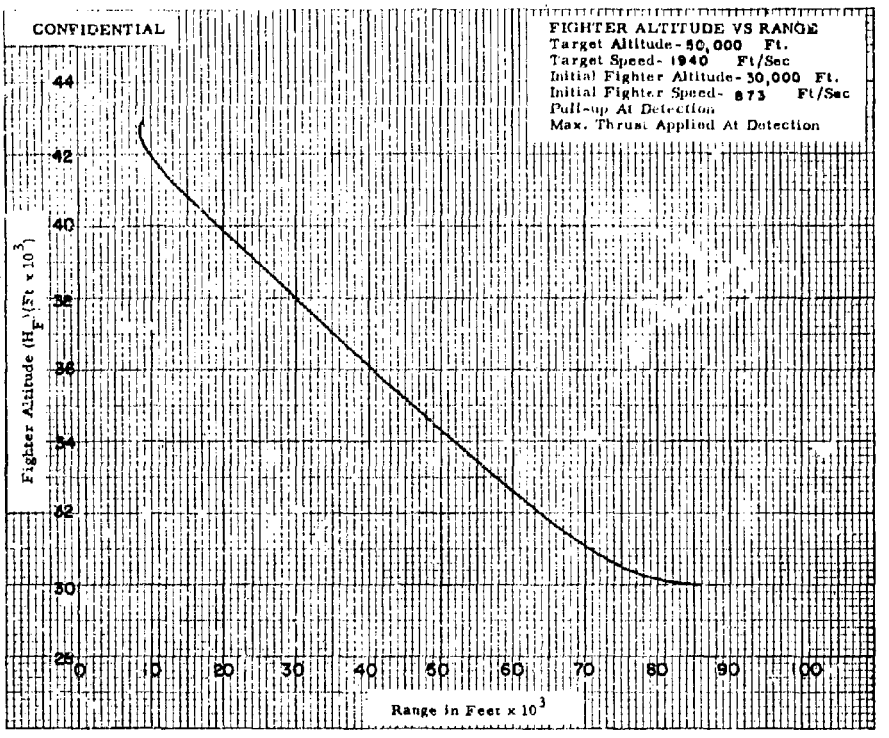


Figure 375


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up At Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3

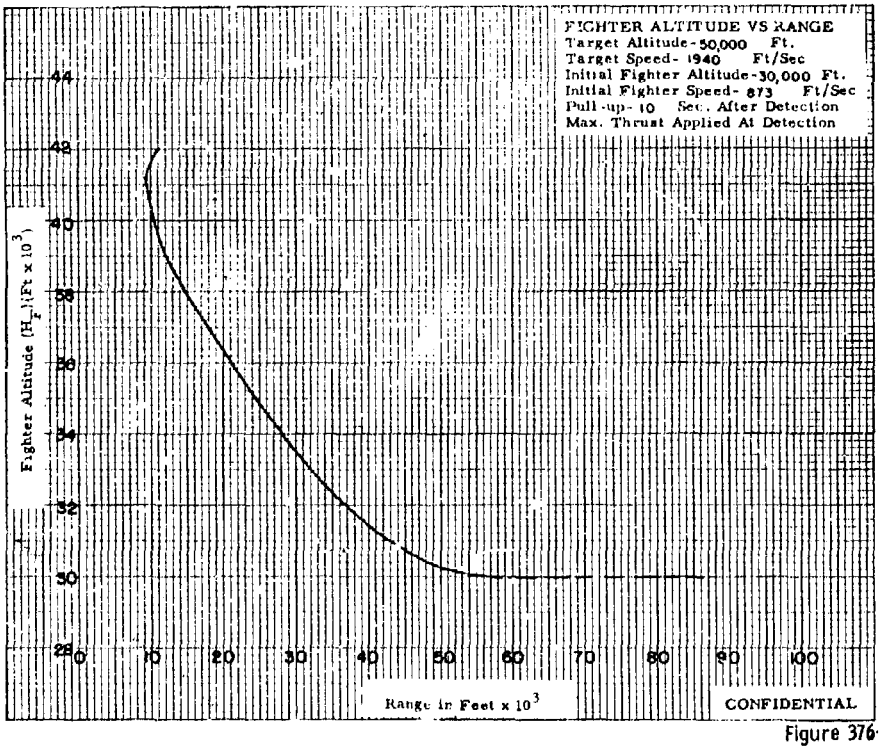
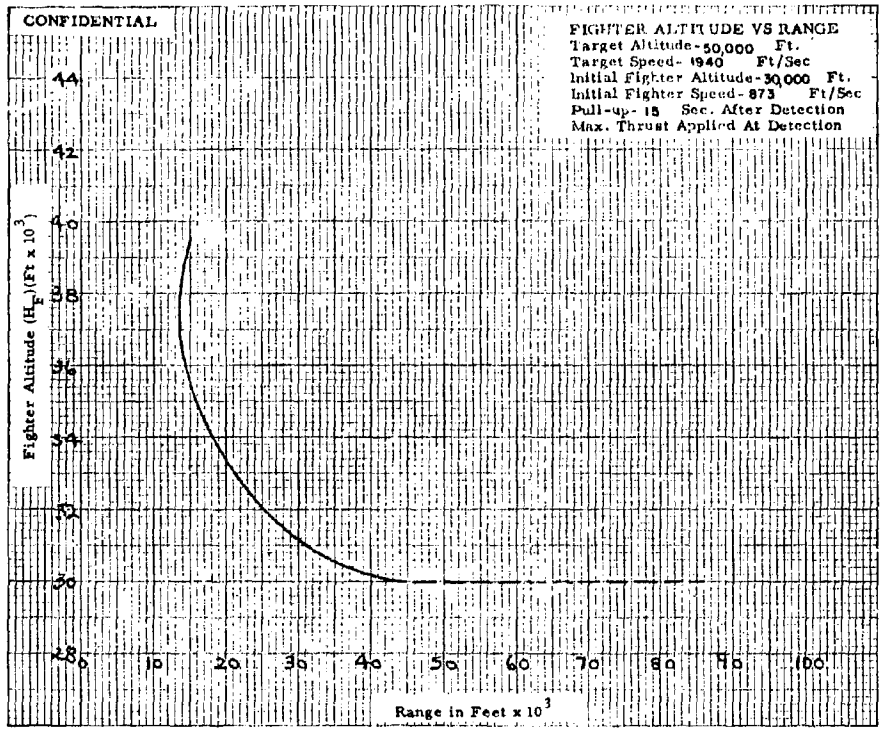

FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3
CONFIDENTIAL

Figure 376


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 15 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
44
42
40
38
36
34
32
30
28
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

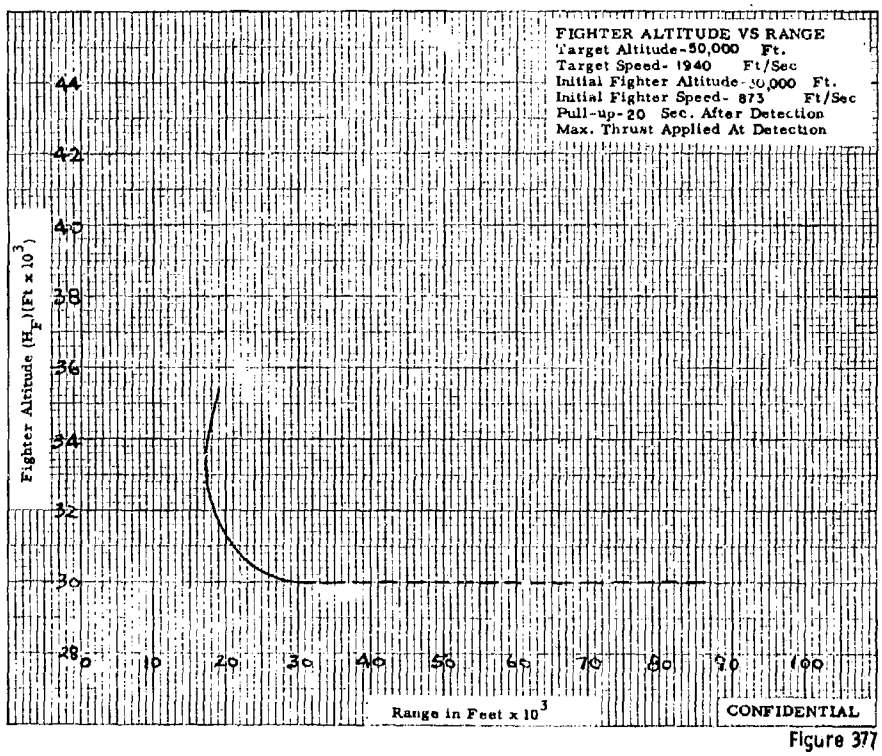
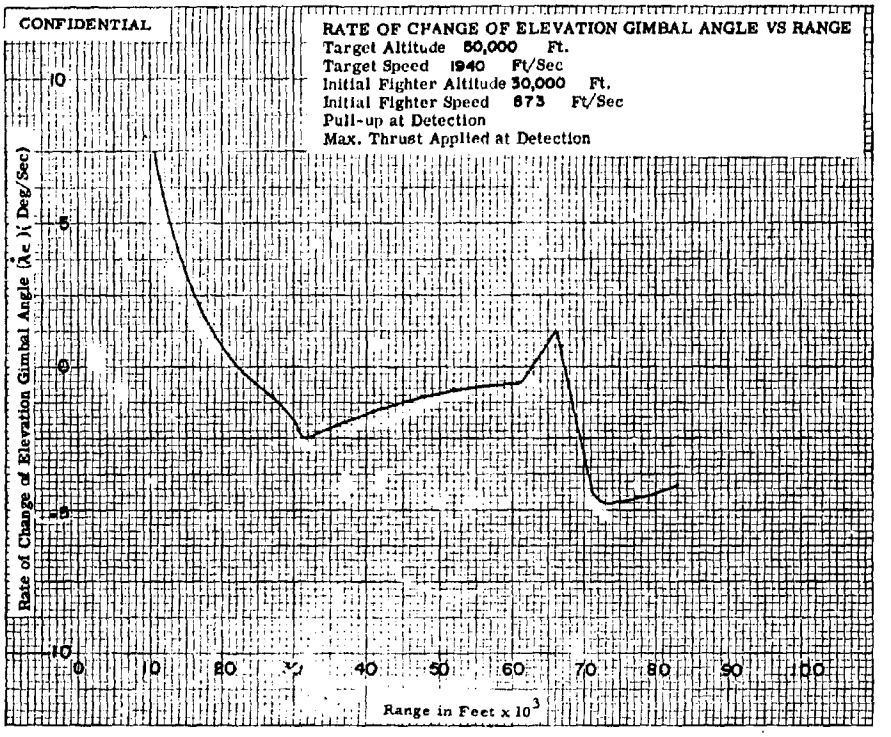

FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up-20 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
44
42
40
38
36
34
32
30
28
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 377


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇ε) Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

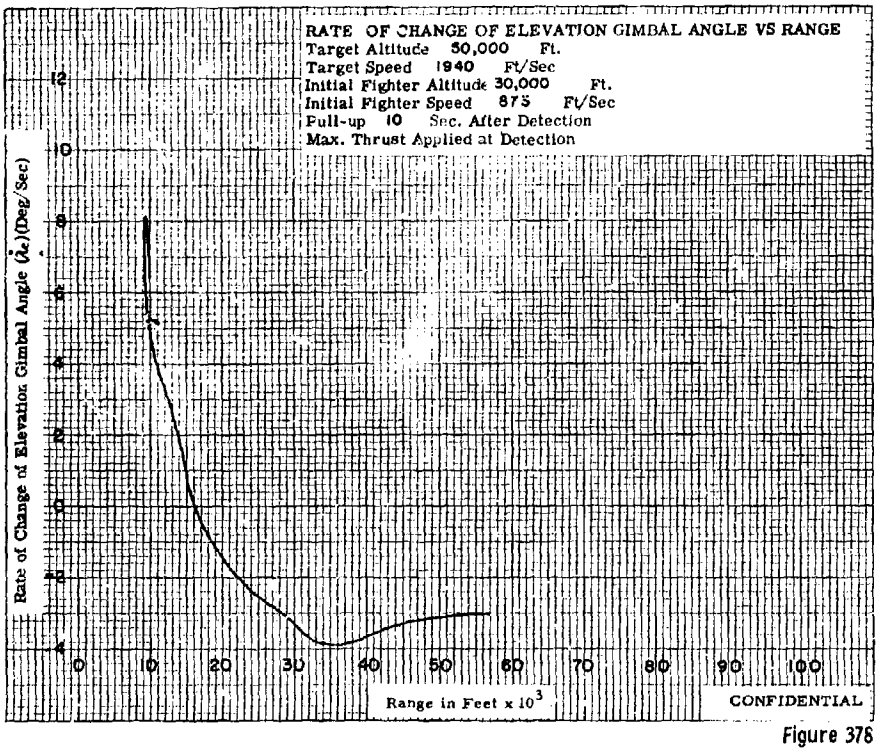

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇ε)(Deg/Sec)
12
10
8
6
4
2
0
-2
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 378

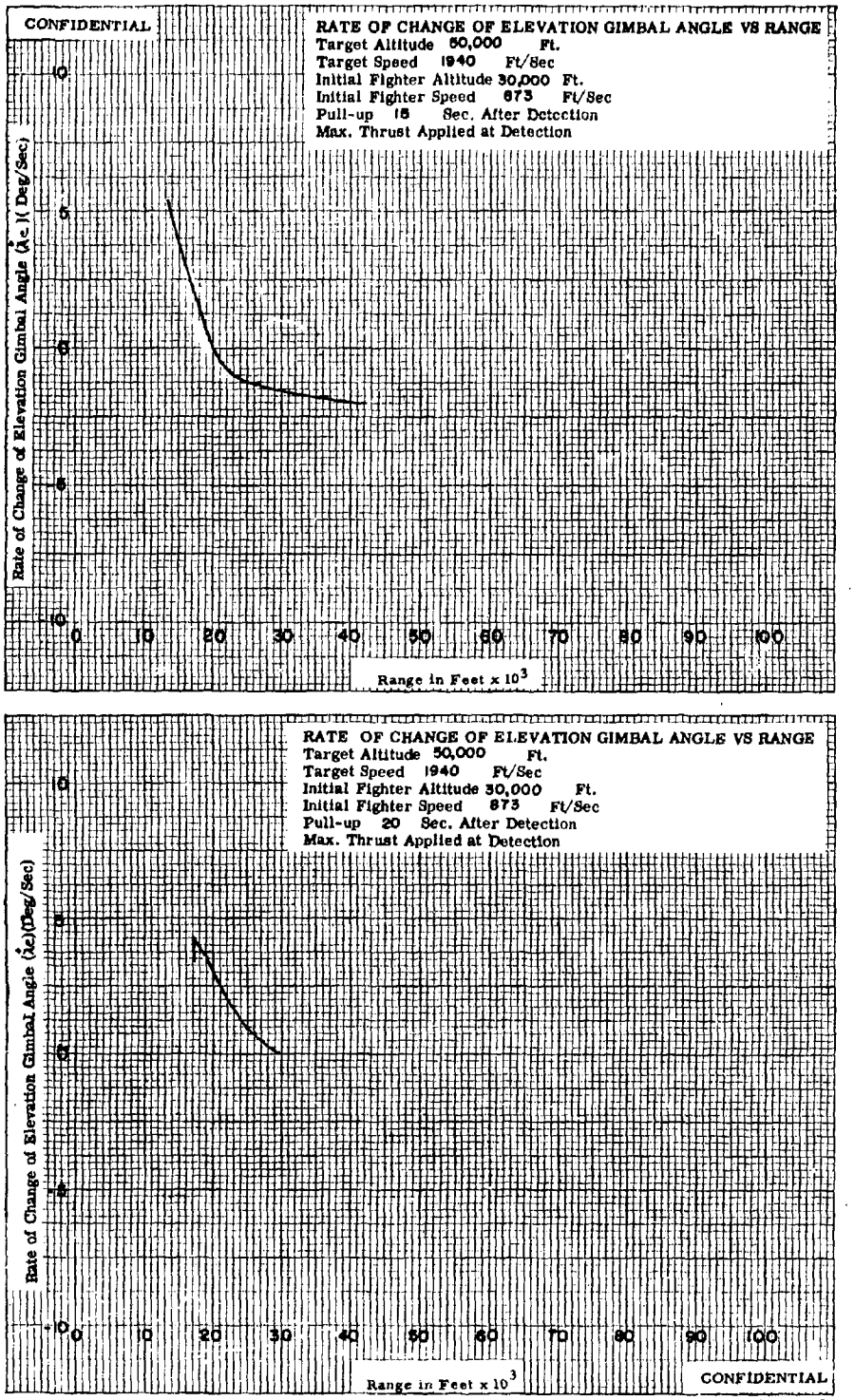
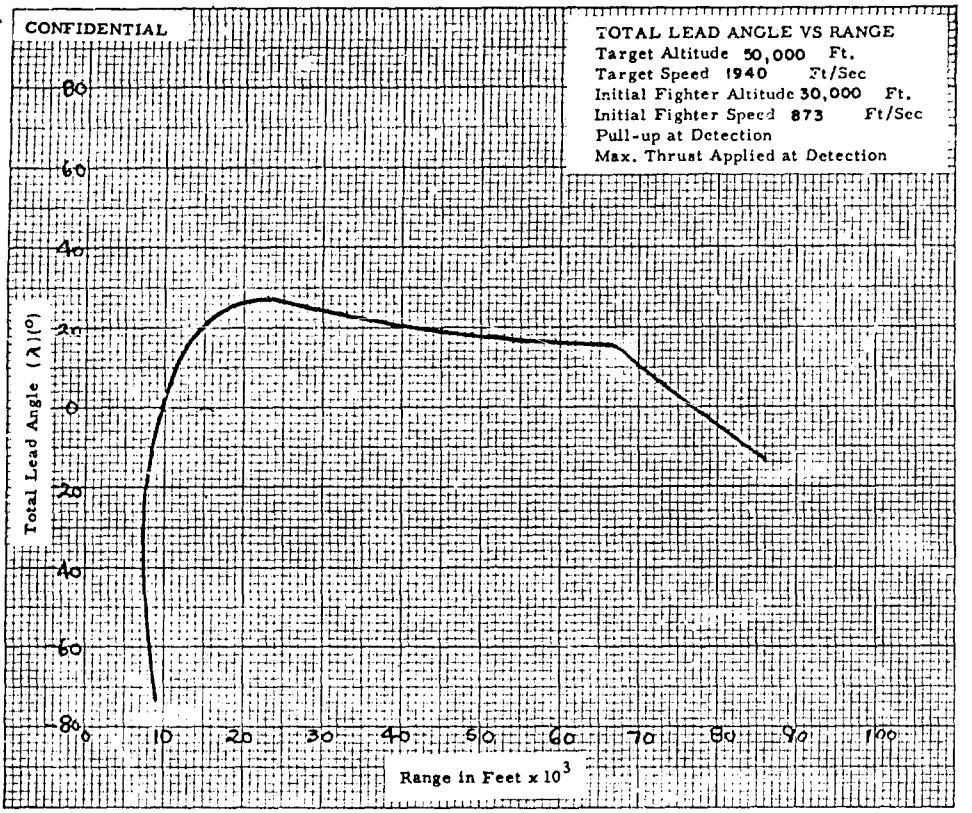

CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇e) (Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 379


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
80
60
40
20
0
-20
-40
-60
-80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

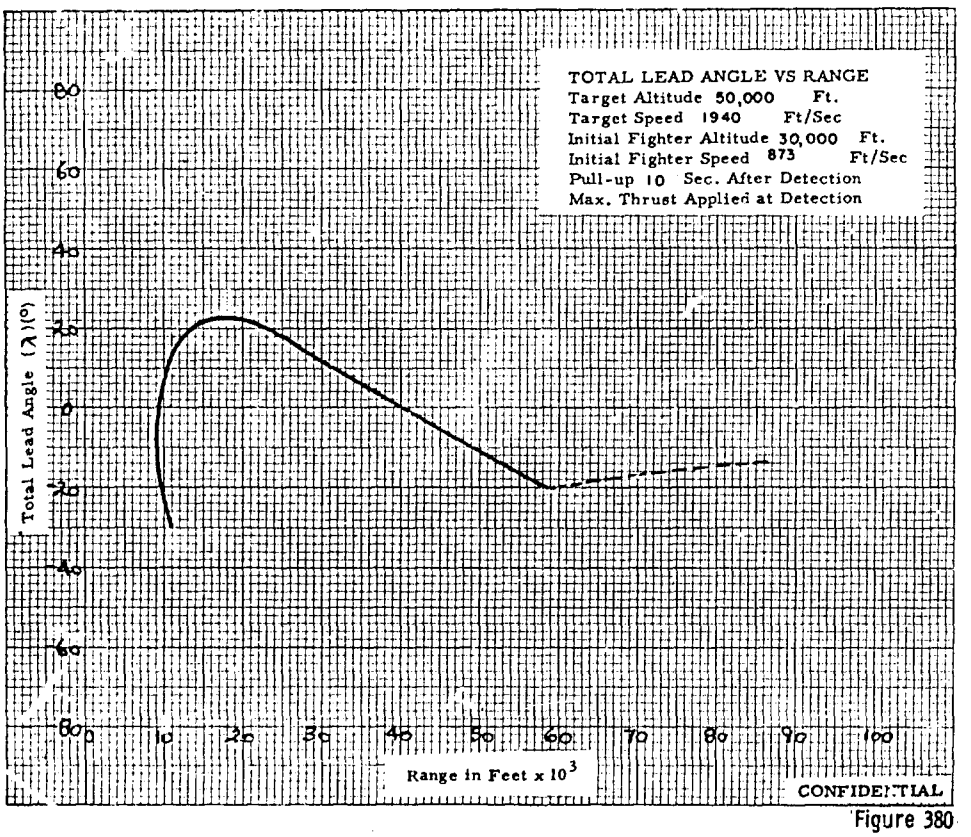
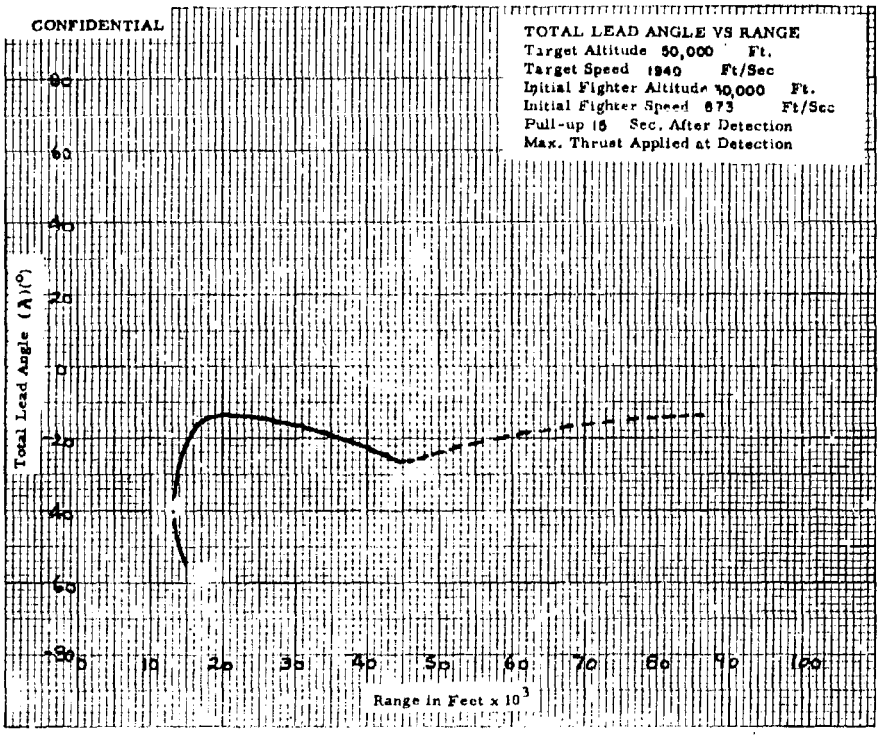

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
80
60
40
20
0
-20
-40
-60
-80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 380


TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
Range in Feet x 10^3

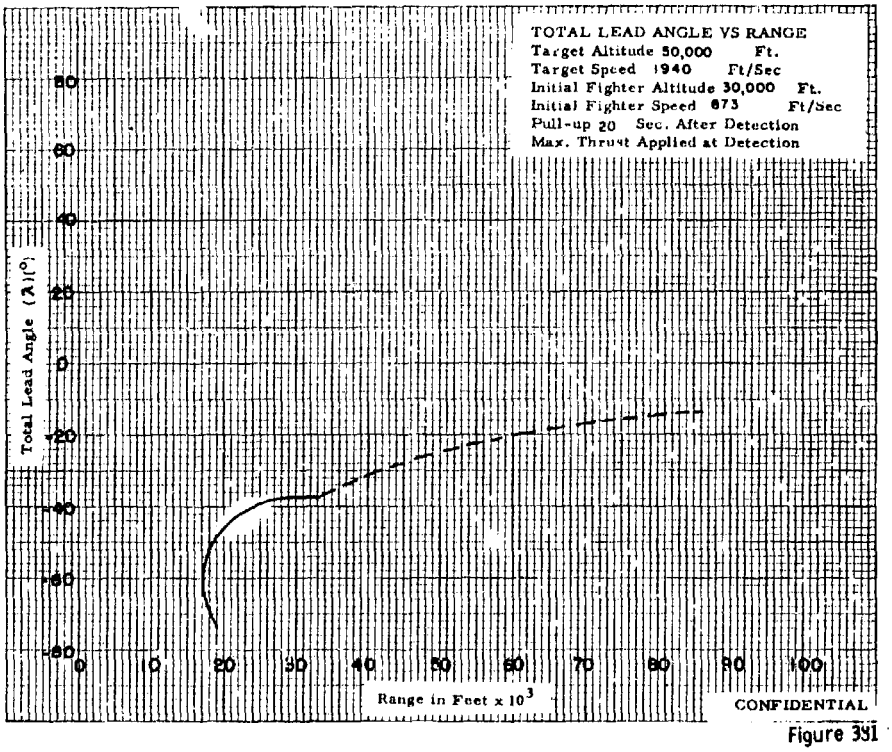
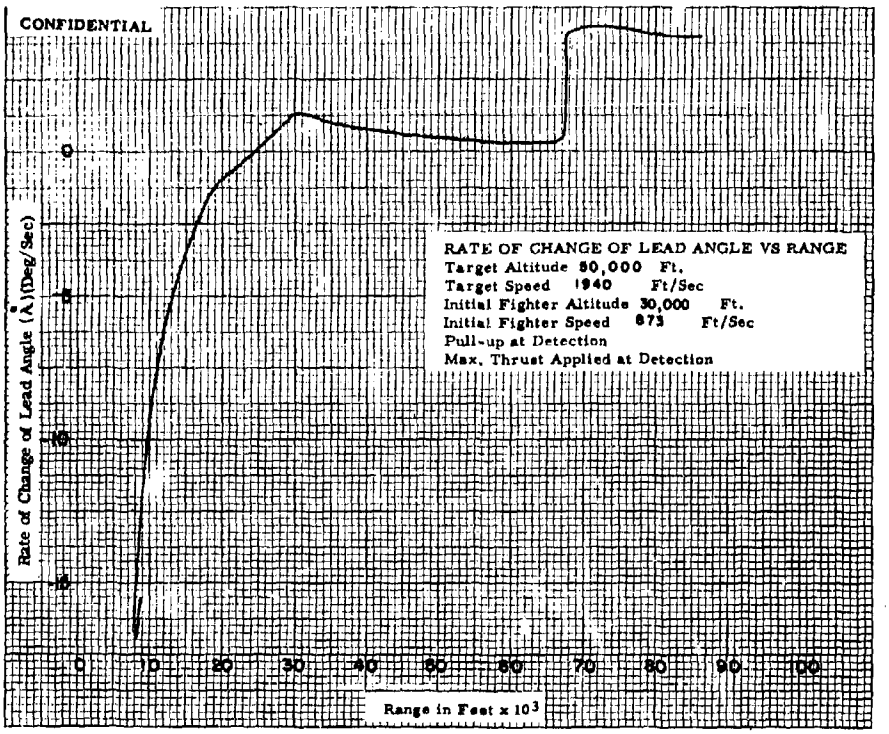

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
Range in Feet x 10^3

Figure 391


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-5
-10
-15
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

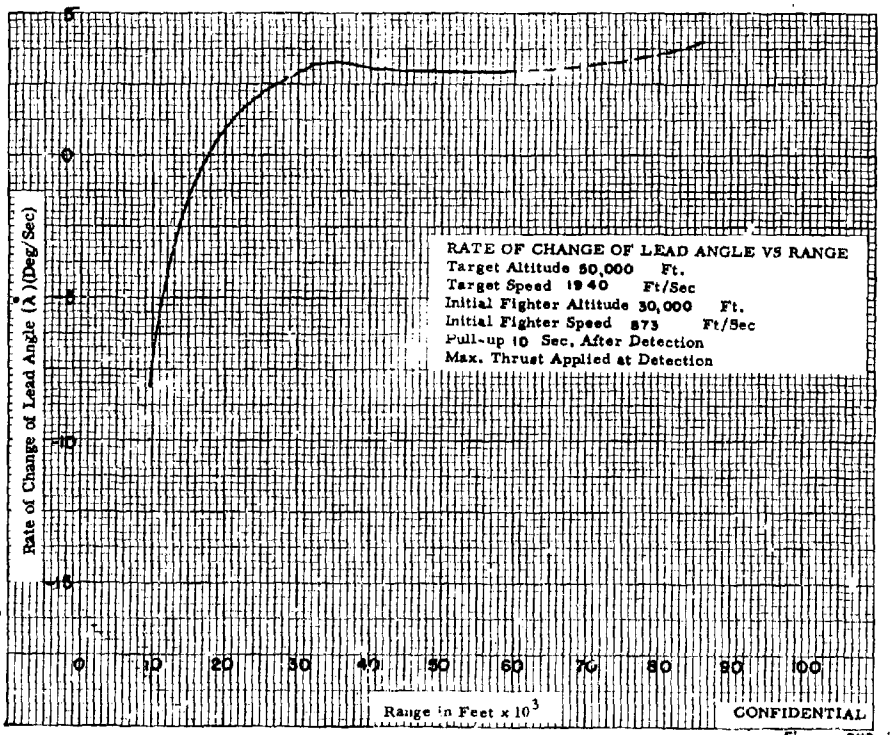
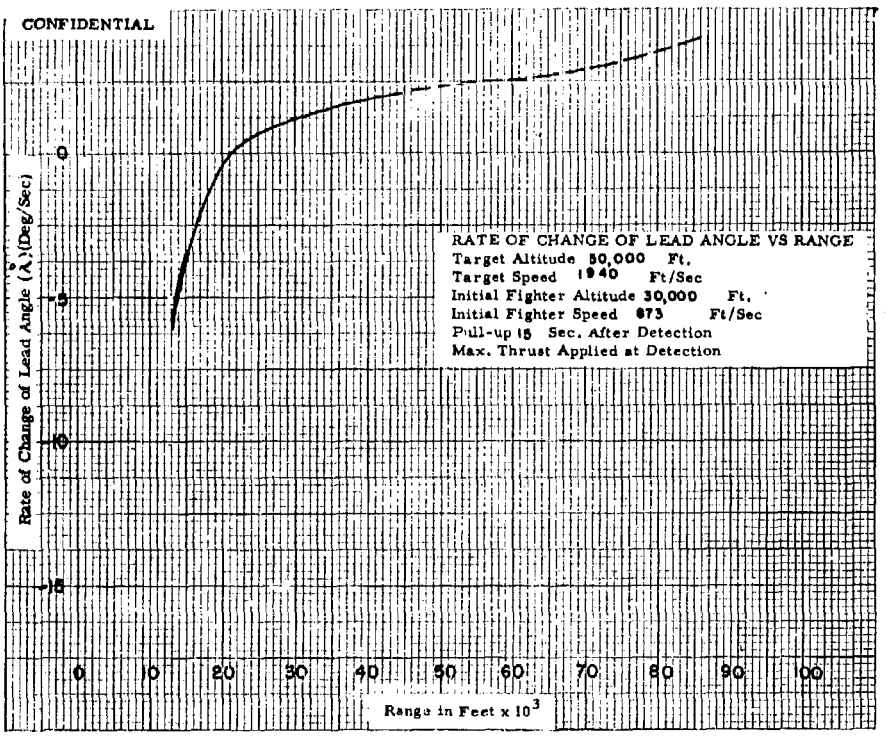

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
5
0
-5
-10
-15
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 3-2


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-5
-10
-15
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

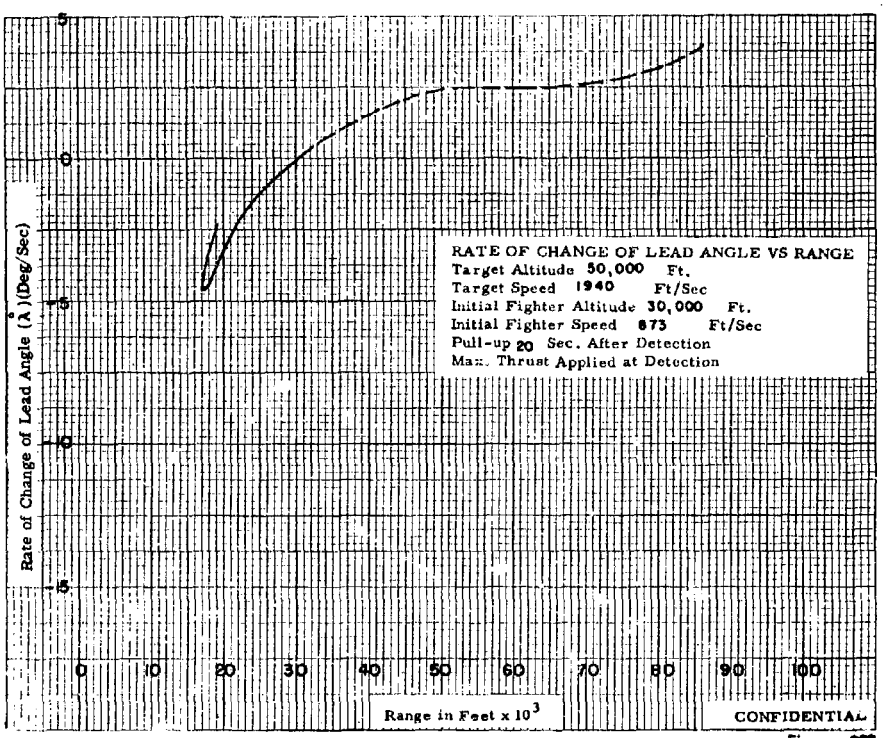
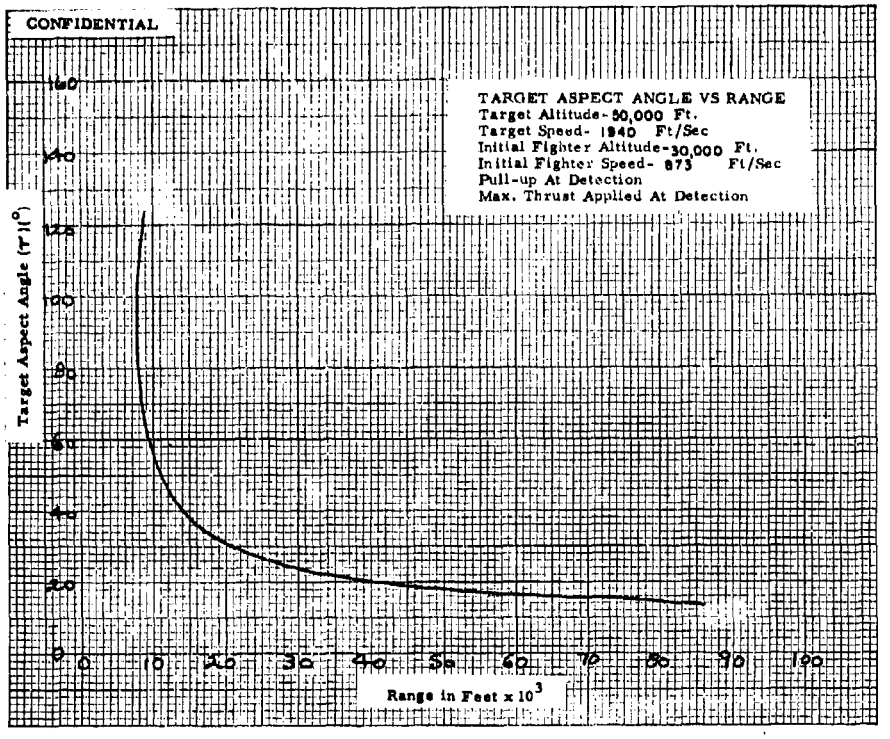
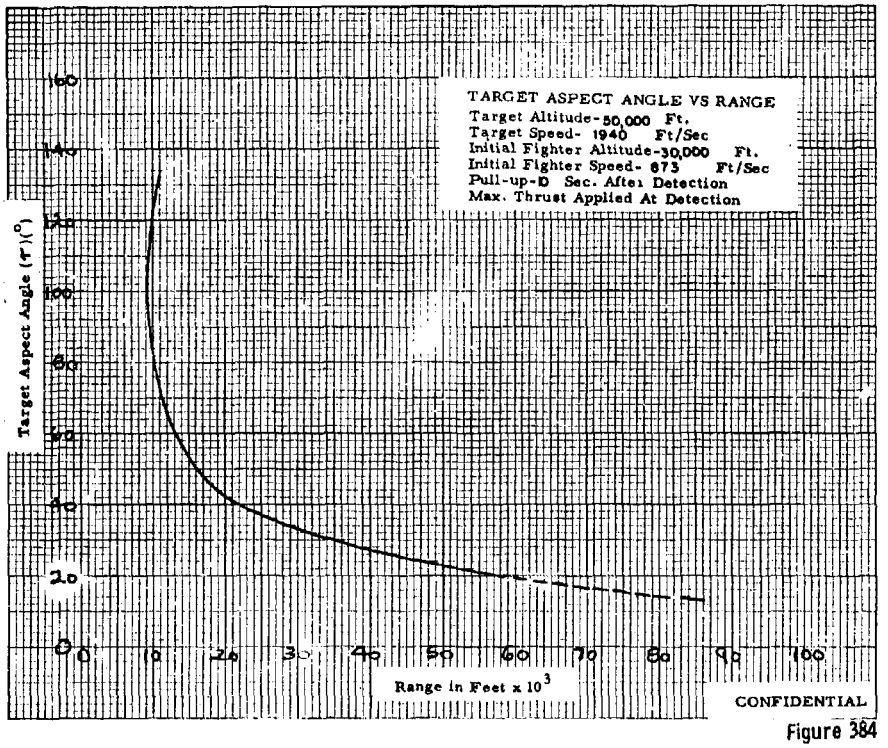

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
5
0
-5
-10
-15
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 28

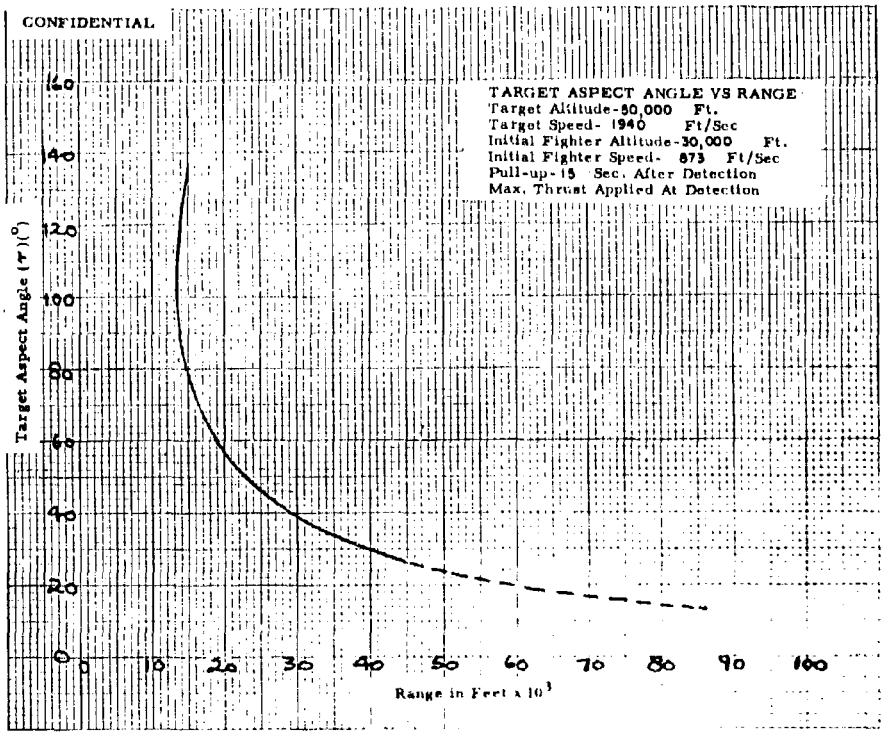
CONFIDENTIAL





CONFIDENTIAL

Figure 384


TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up-15 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

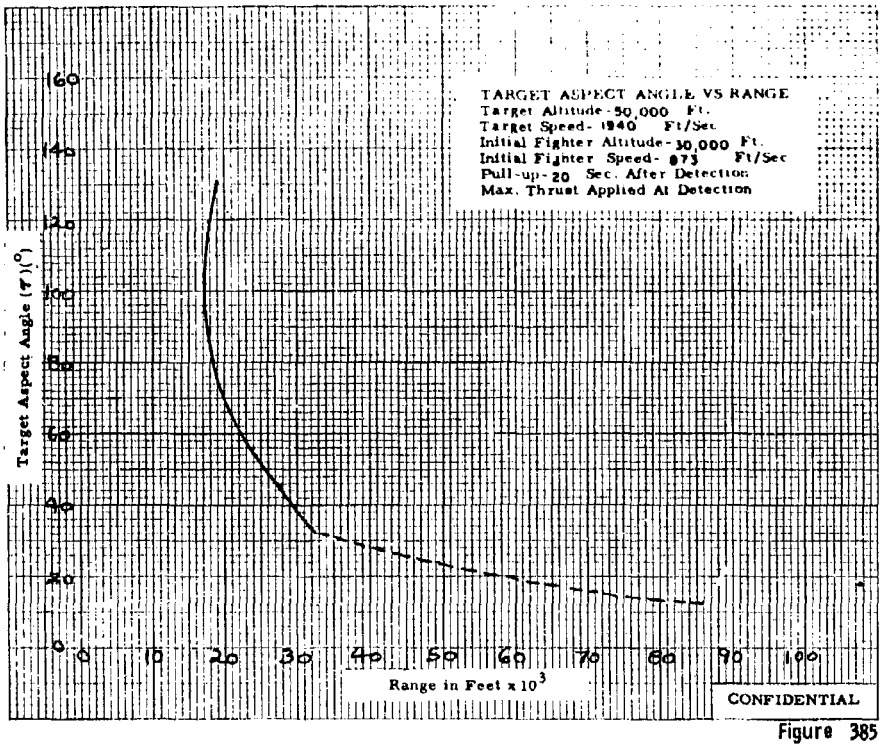
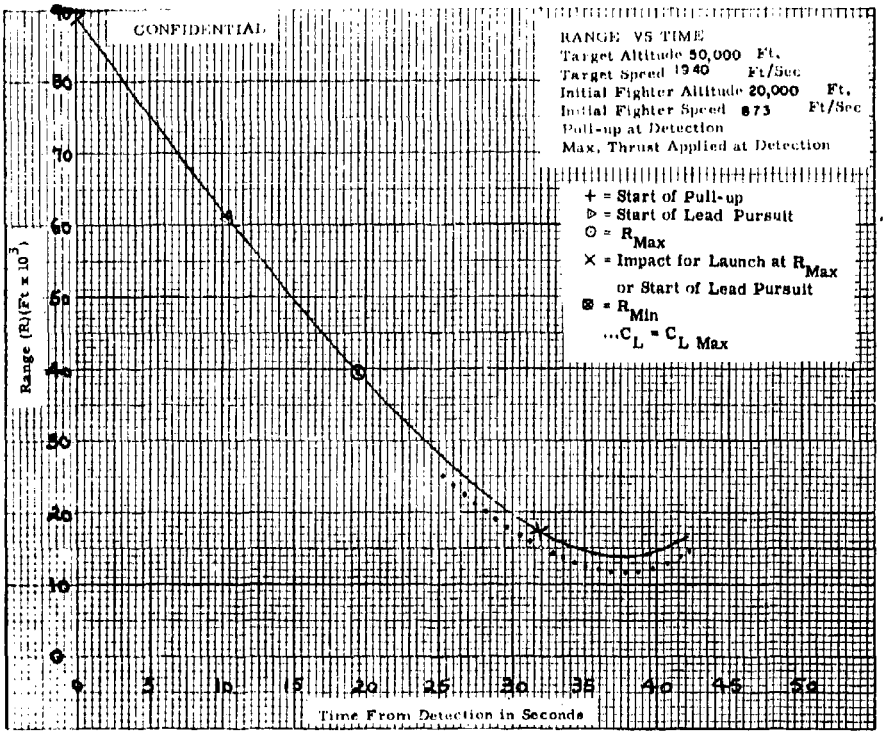

TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up-20 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 385


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft. x 10^3)
Time From Detection in Seconds

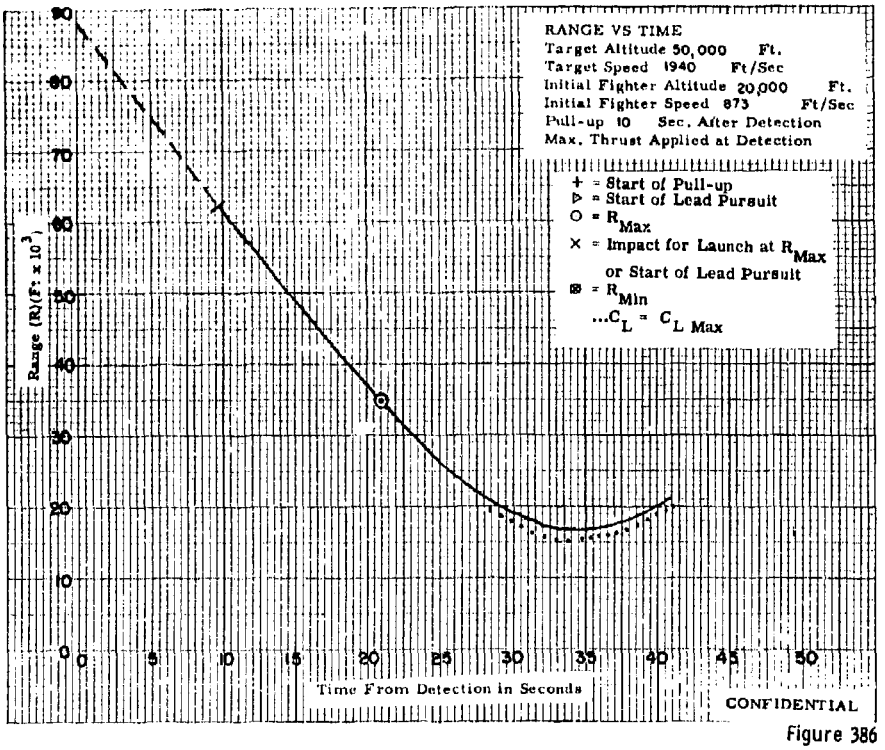

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft. x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 386

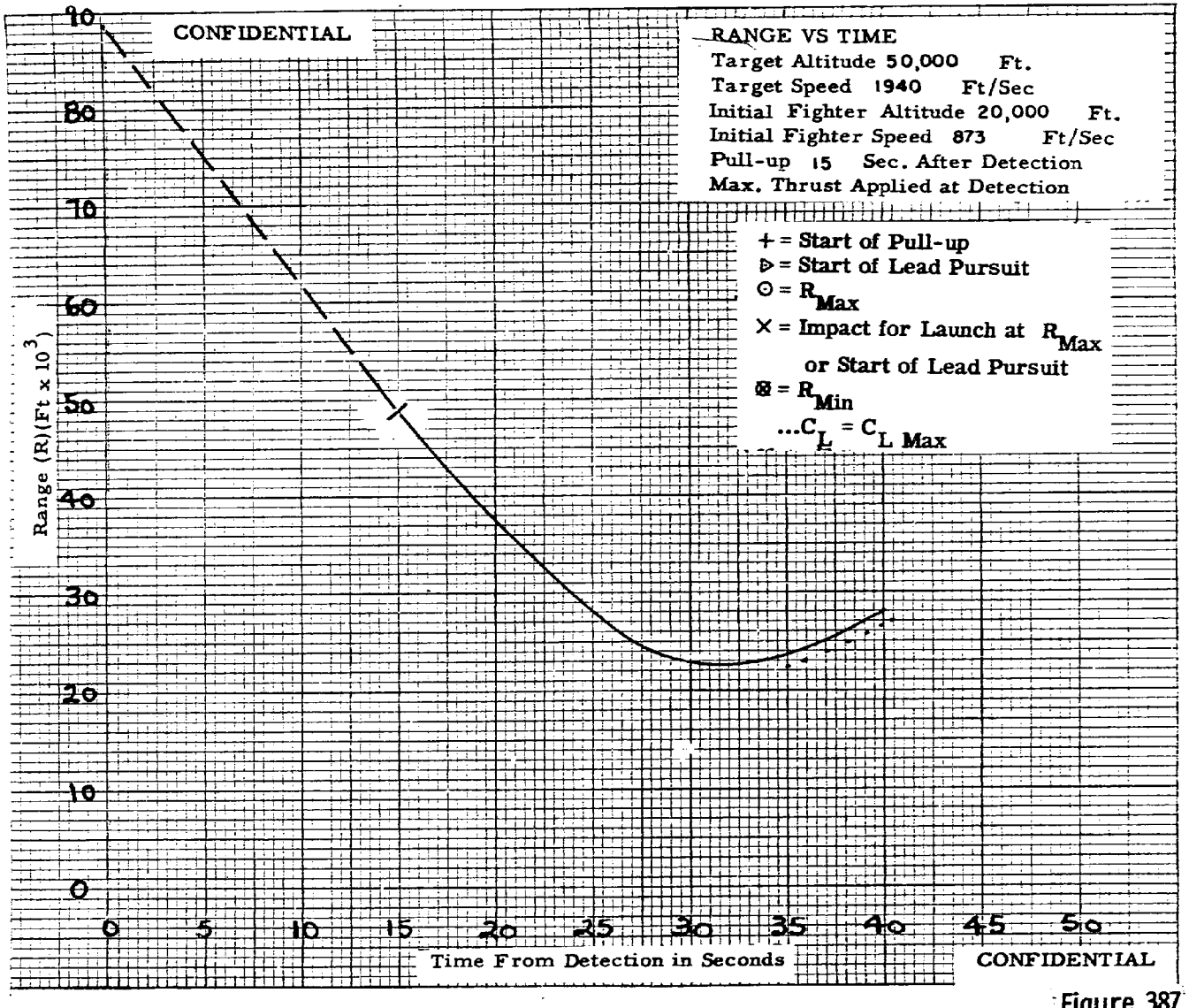
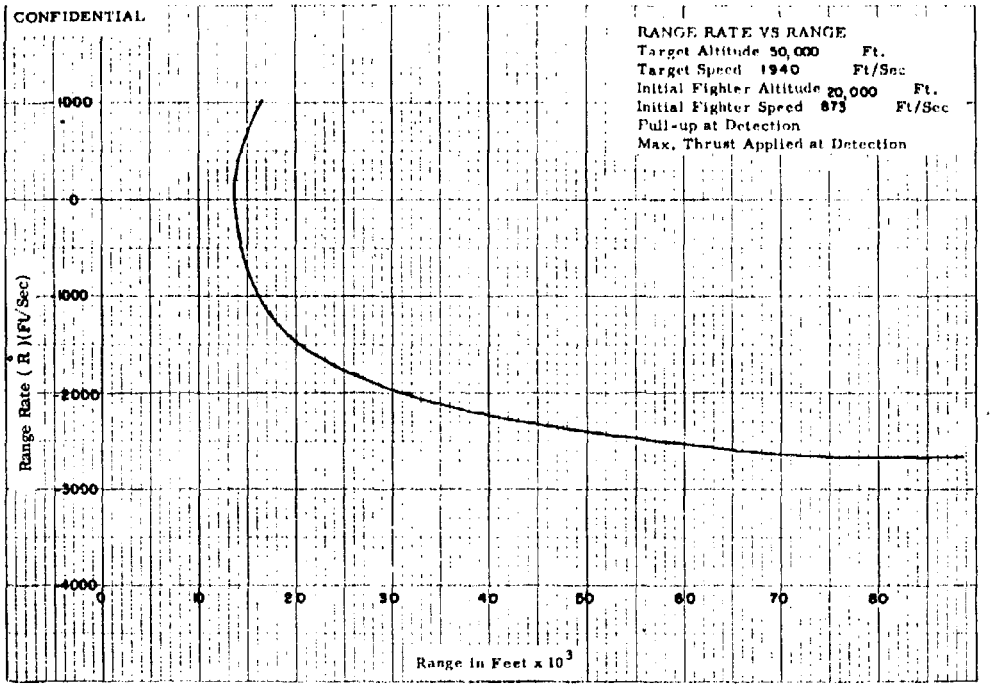

CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
CONFIDENTIAL

Figure 387


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate ($\dot{R}$) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

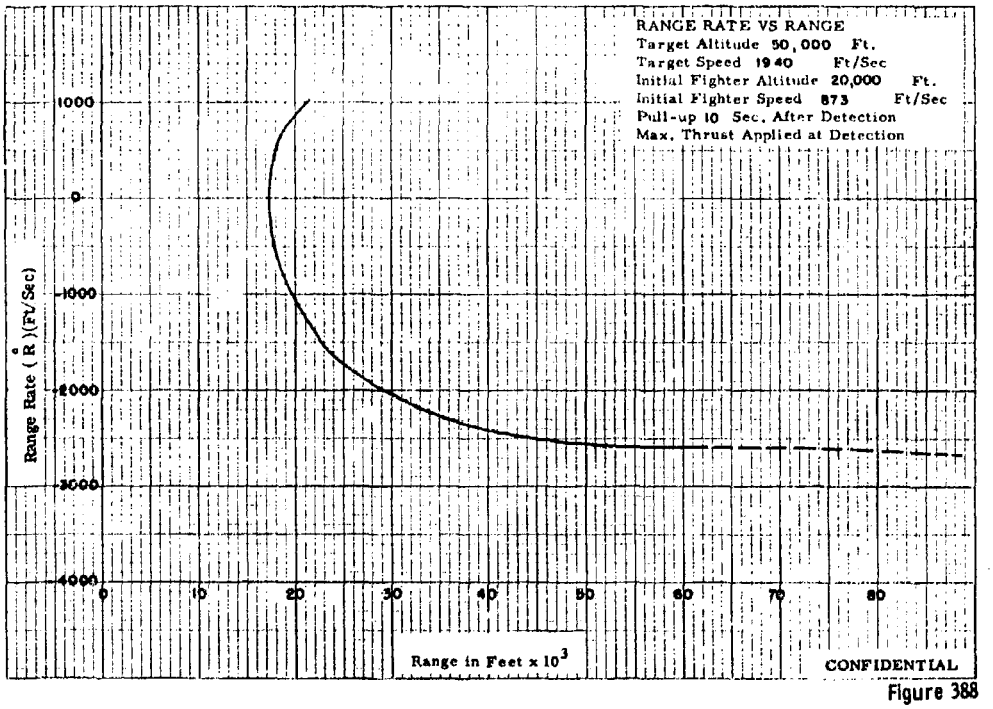

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate ($\dot{R}$) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

Figure 388

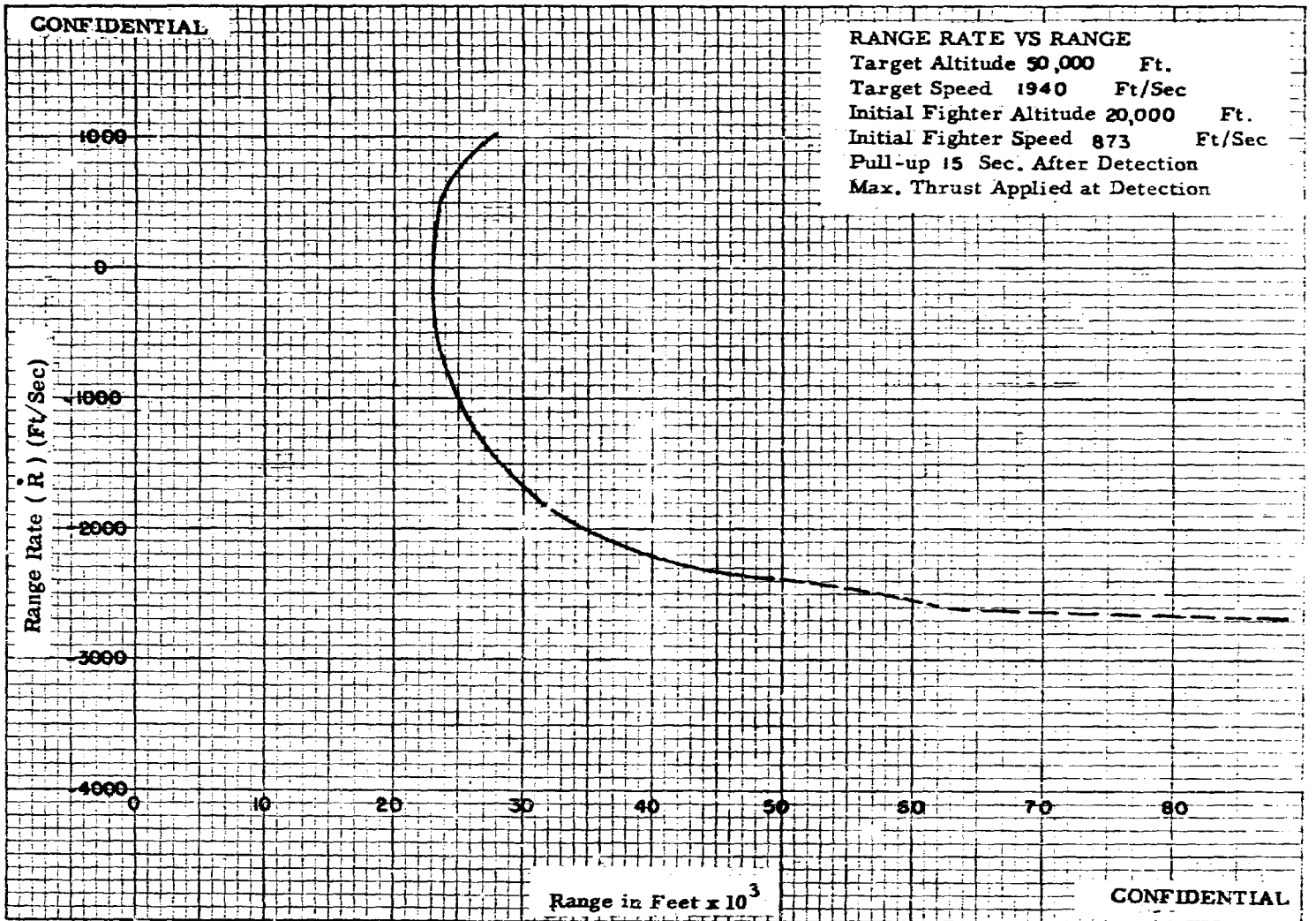
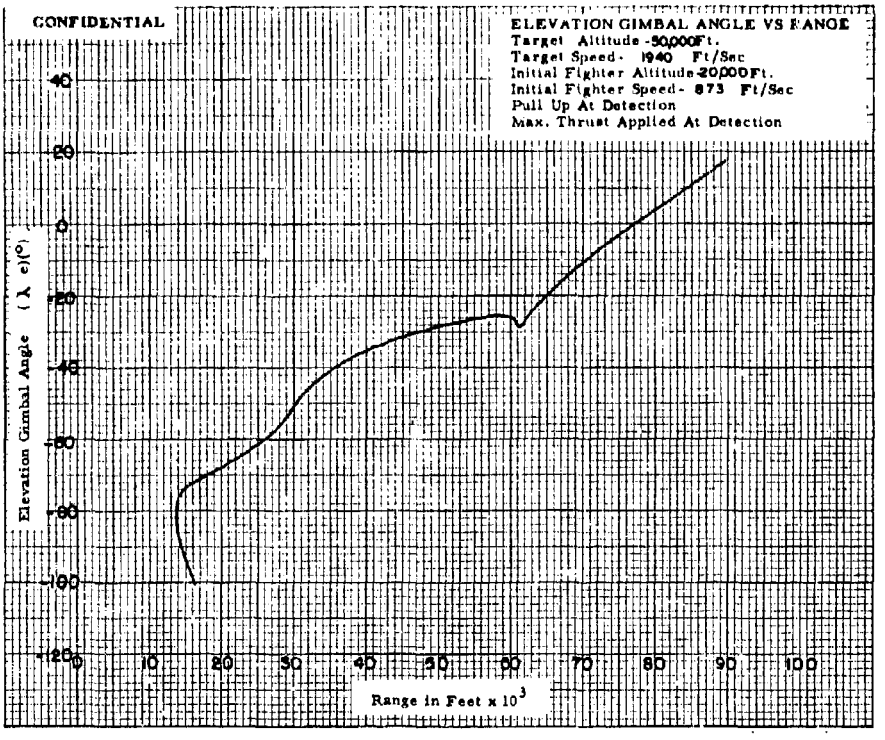

CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
1000
0
-1000
-2000
-3000
-4000
Range Rate (Ṙ) (Ft/Sec)
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 389


CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude -50,000Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-20,000Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull Up At Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λ e)(°)
40
20
0
-20
-40
-60
-80
-100
-120
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

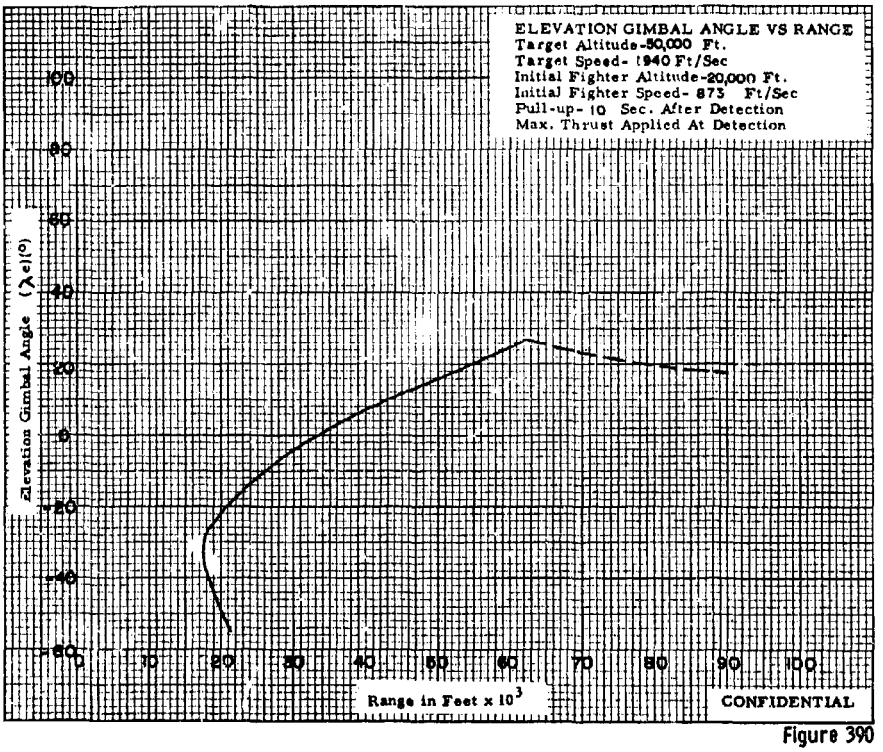

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λ e)(°)
100
80
60
40
20
0
-20
-40
-60
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 390

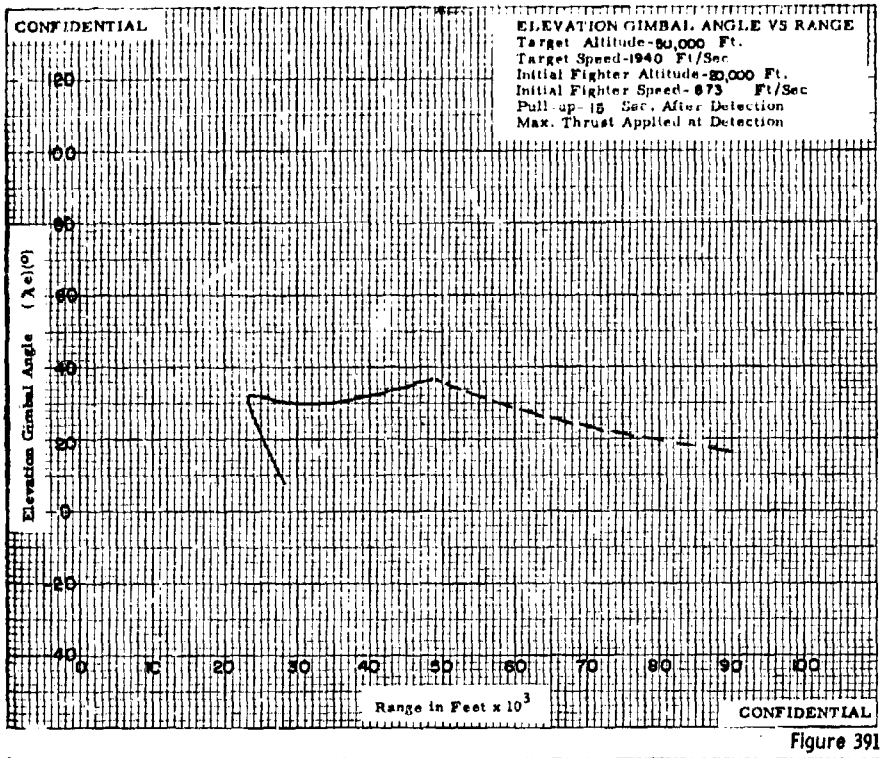


Figure 391

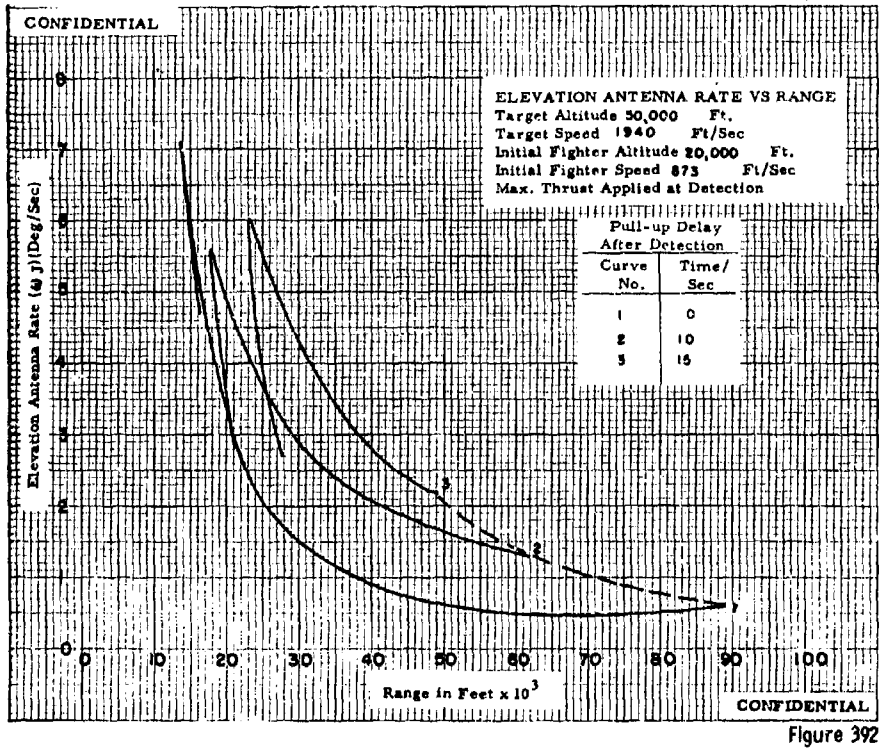


Figure 392

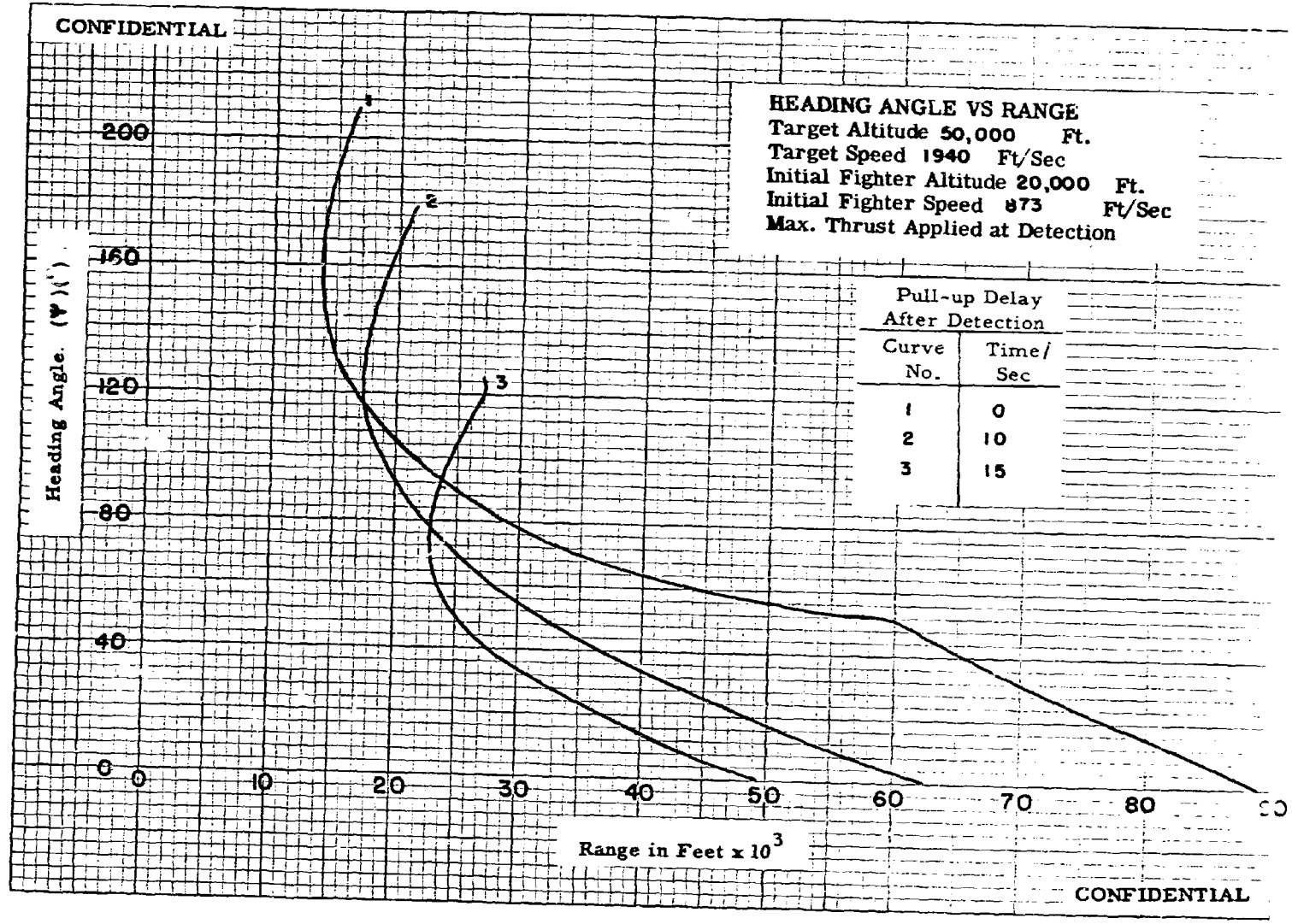
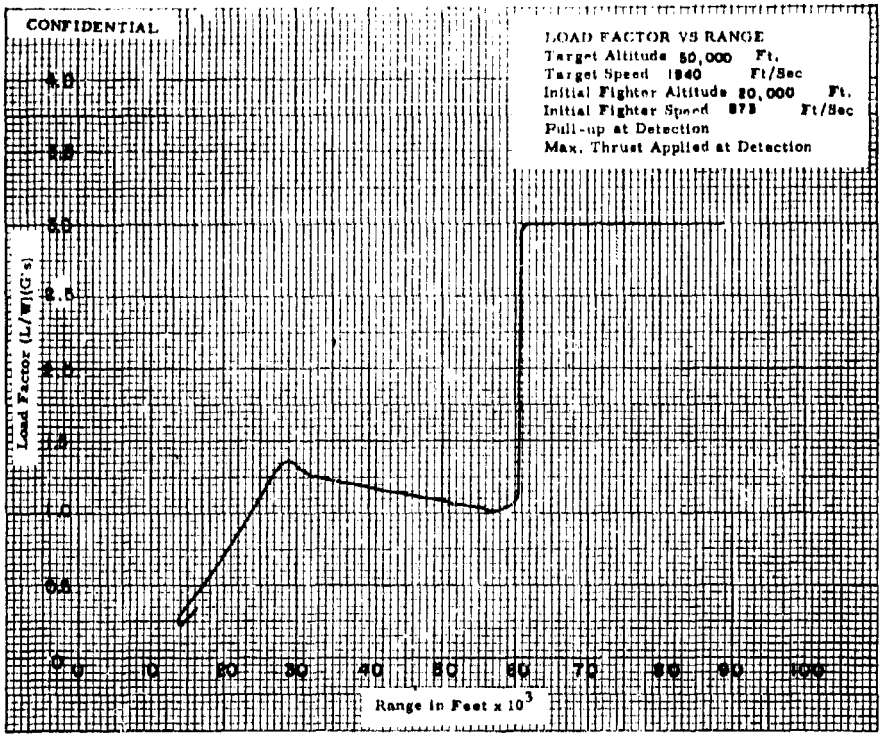

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 15
Heading Angle. (Ψ)(°)
200
160
120
80
40
0
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 393


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 875 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

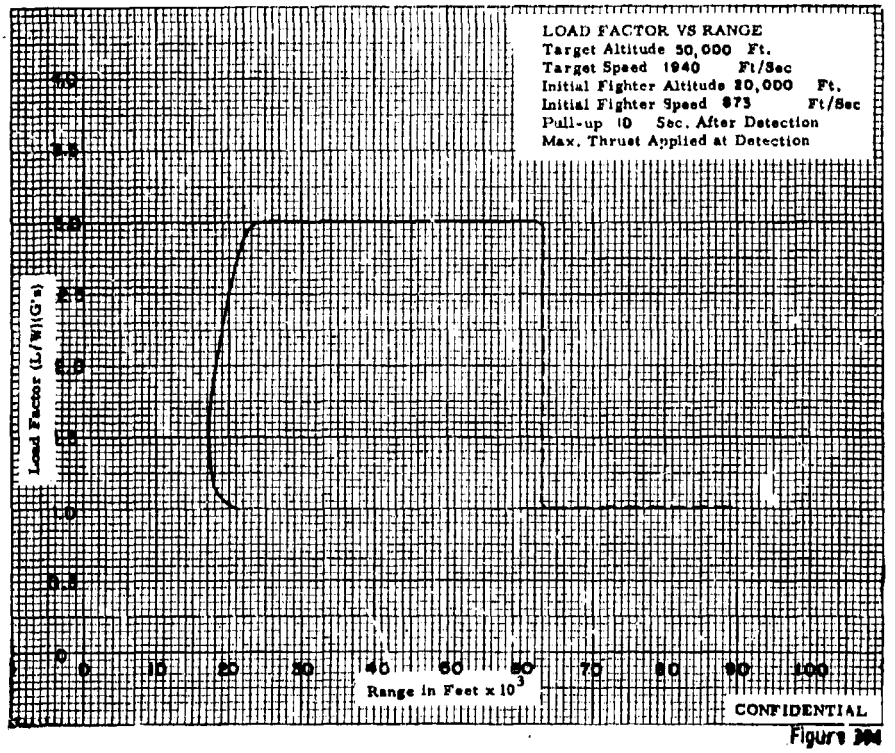

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 875 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

Figure 304

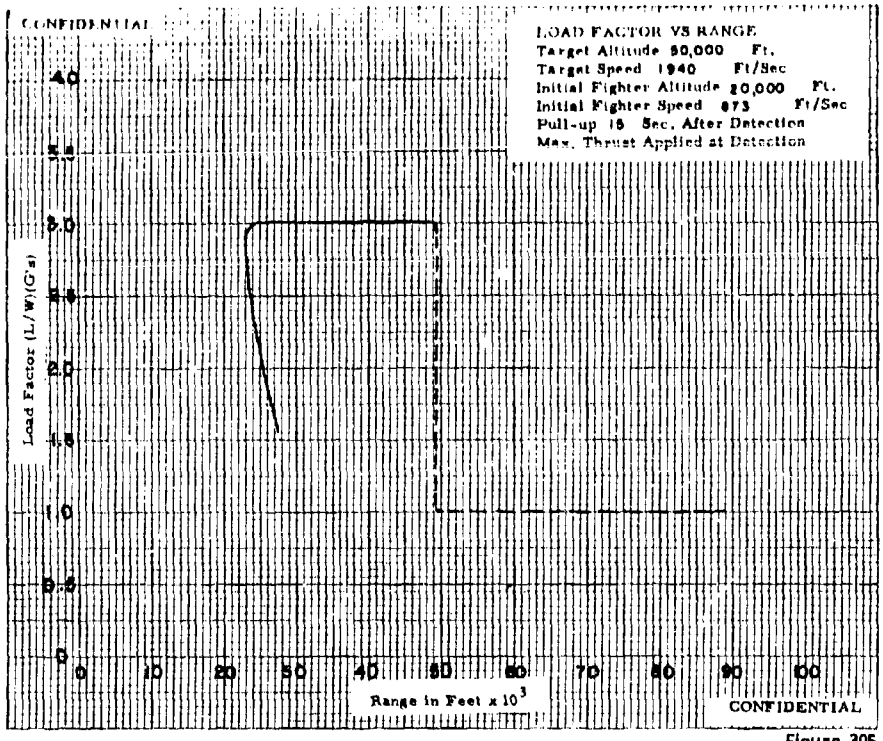


Figure 395

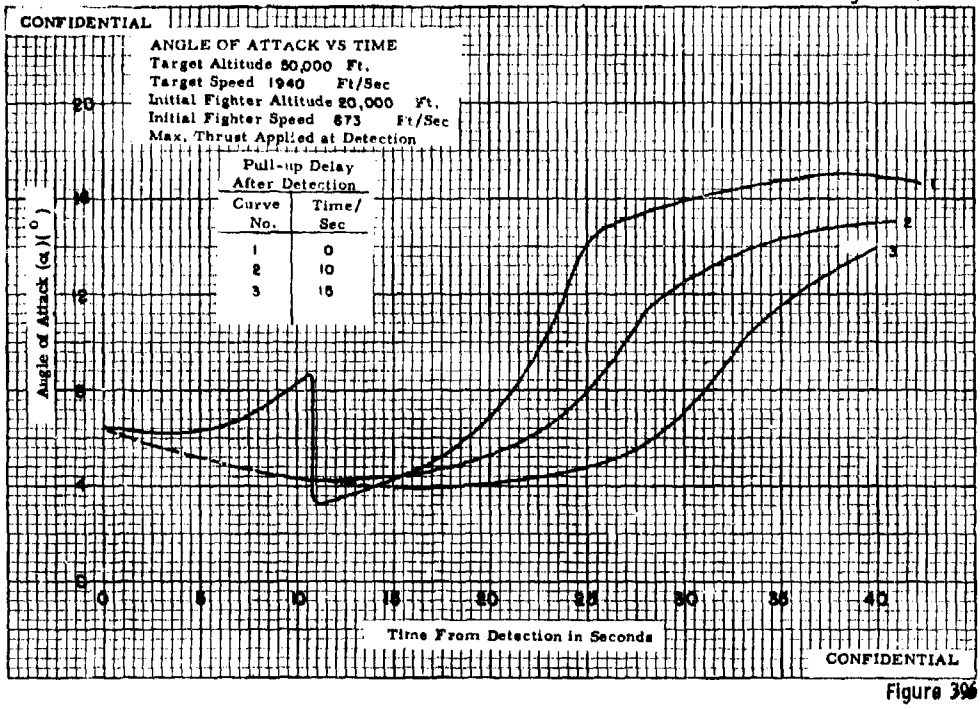


Figure 396

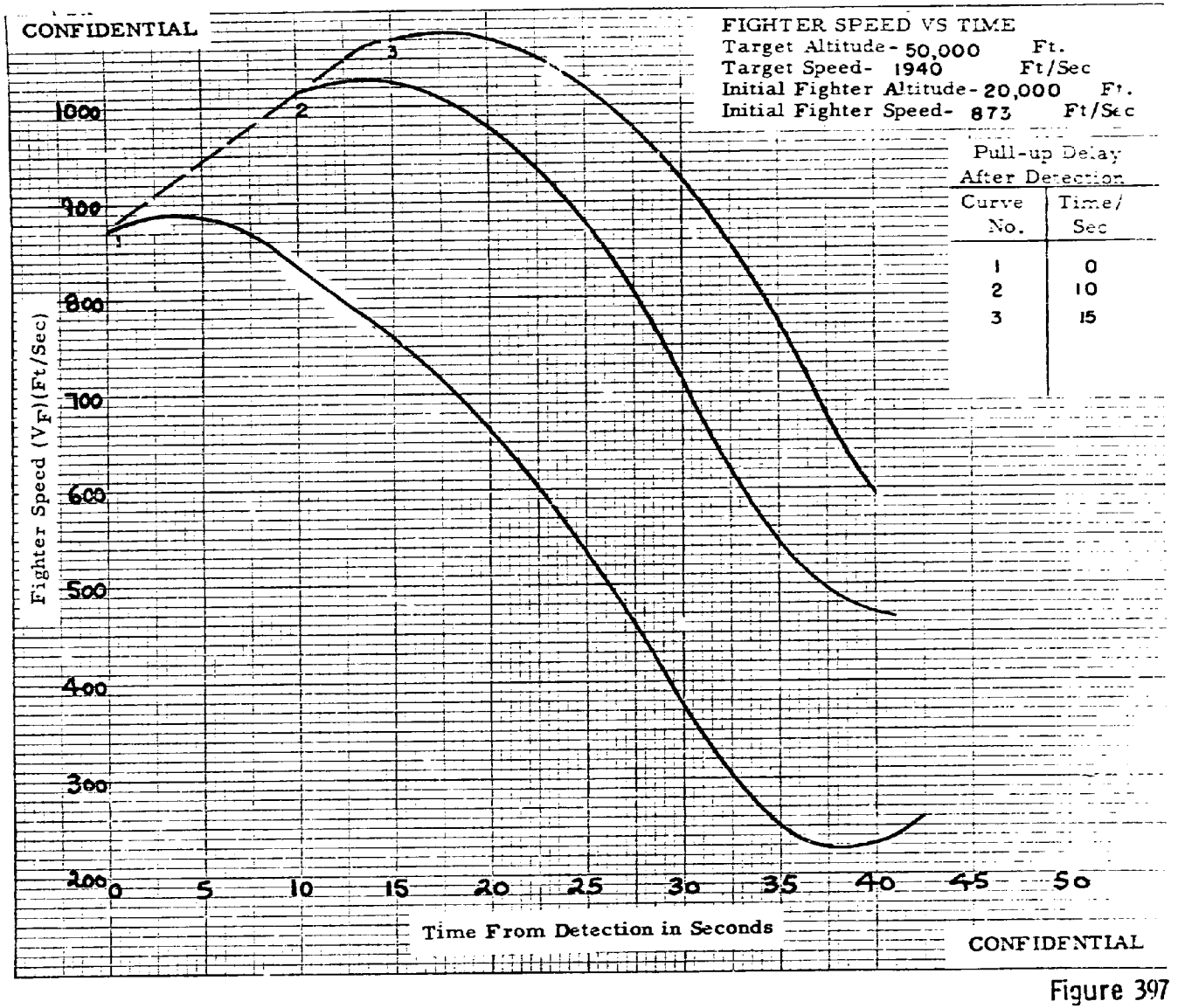
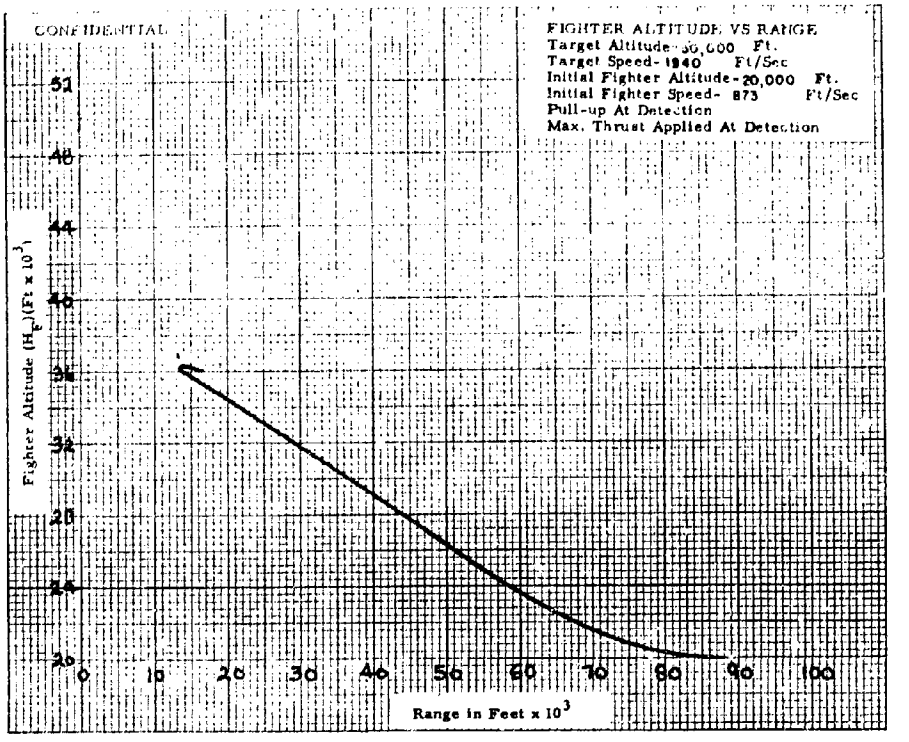

CONFIDENTIAL
FIGHTER SPEED VS TIME
Target Altitude- 50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 15
Fighter Speed (V_F)(Ft/Sec)
1000
900
800
700
600
500
400
300
200
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds
CONFIDENTIAL

Figure 397


FIGHTER ALTITUDE VS RANGE
Target Altitude- 50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up At Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3

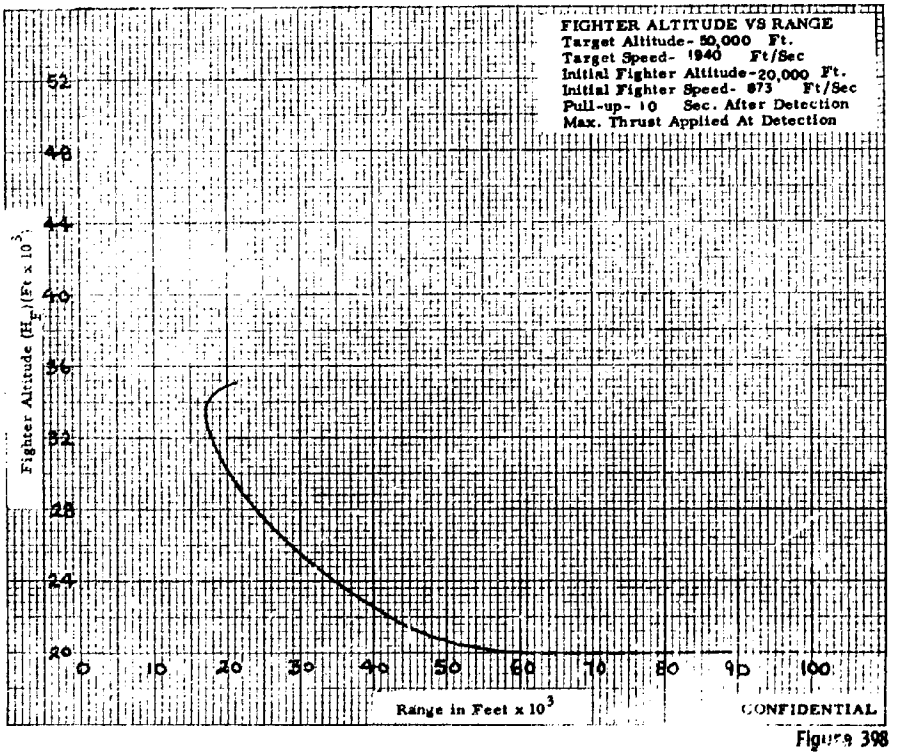

FIGHTER ALTITUDE VS RANGE
Target Altitude- 50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3

Figure 398

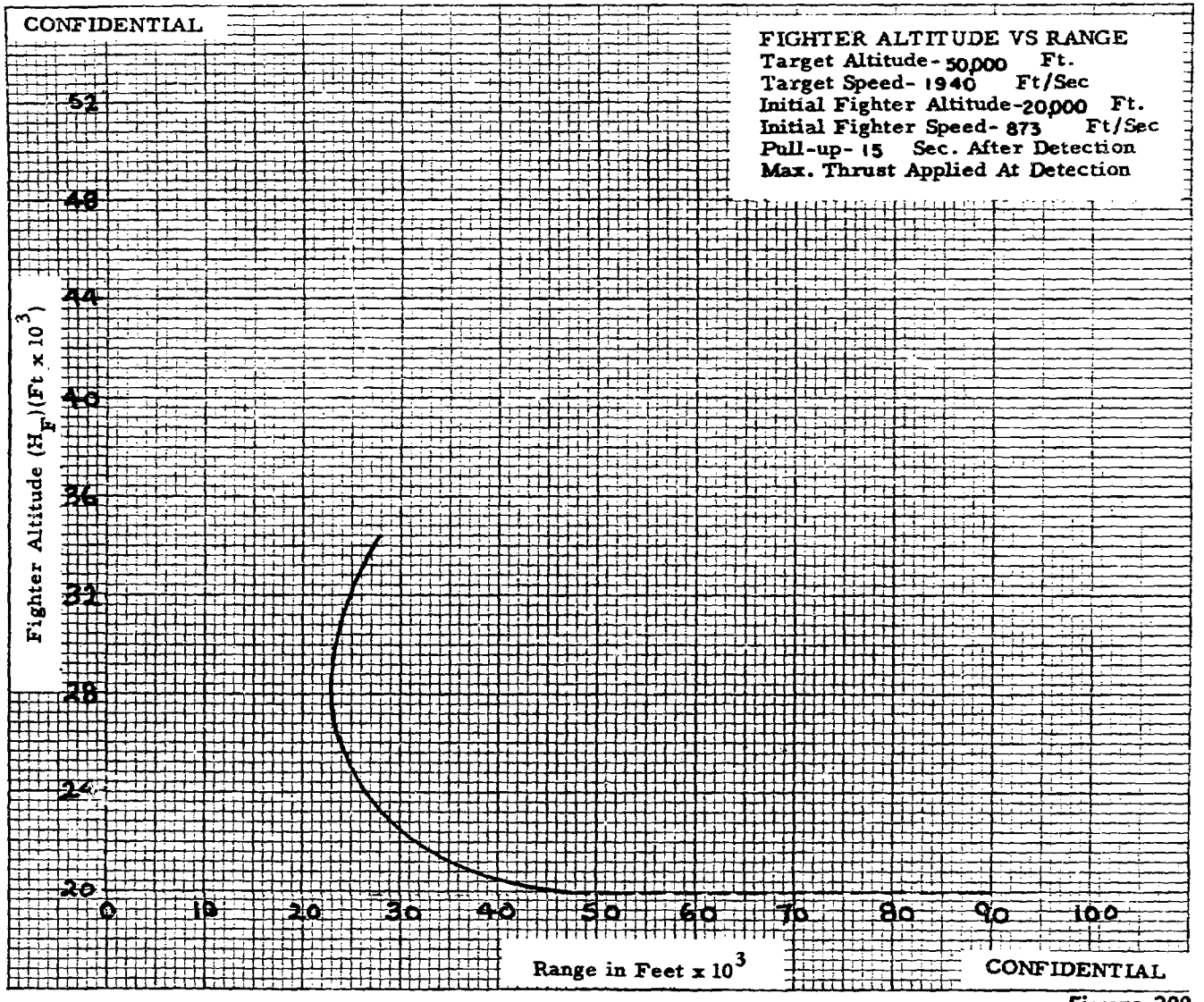
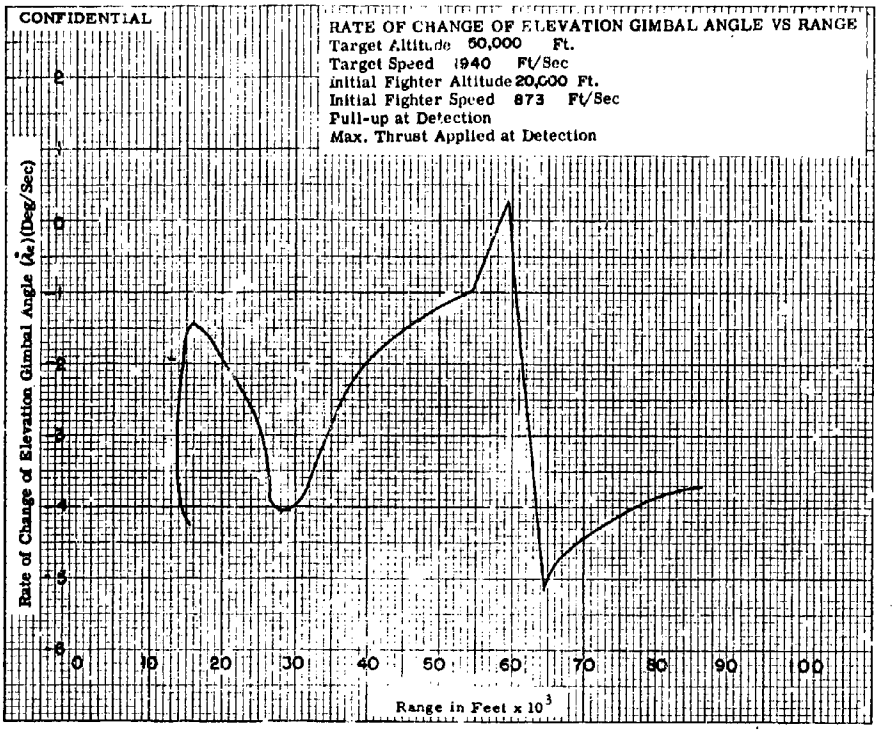

CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude- 50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 15 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
52
48
44
40
36
32
28
24
20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 399


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
Range in Feet x 10^3

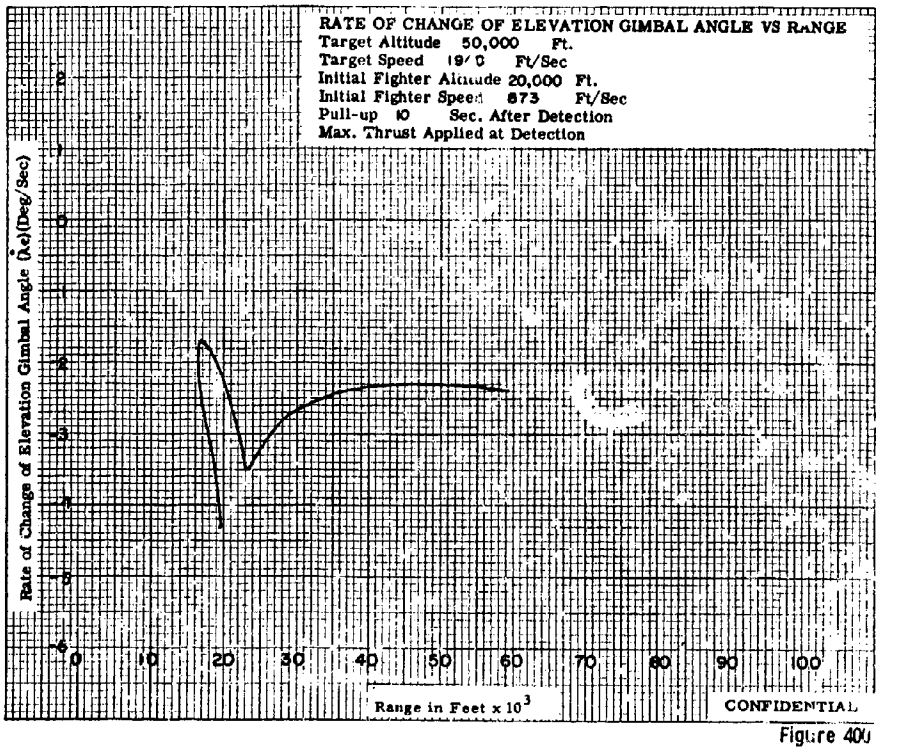

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 400

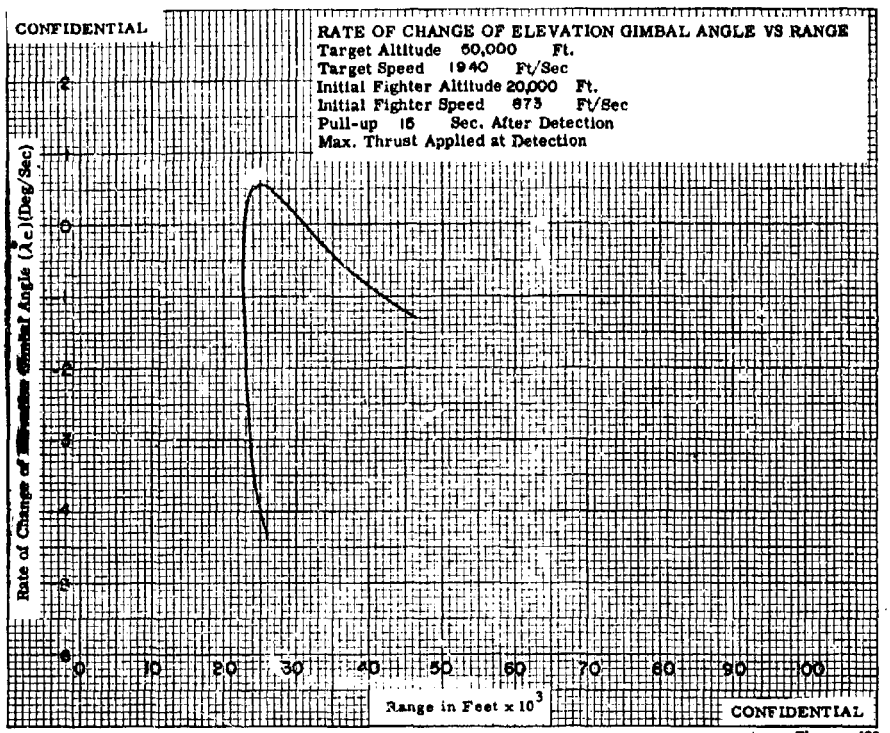


Figure 401

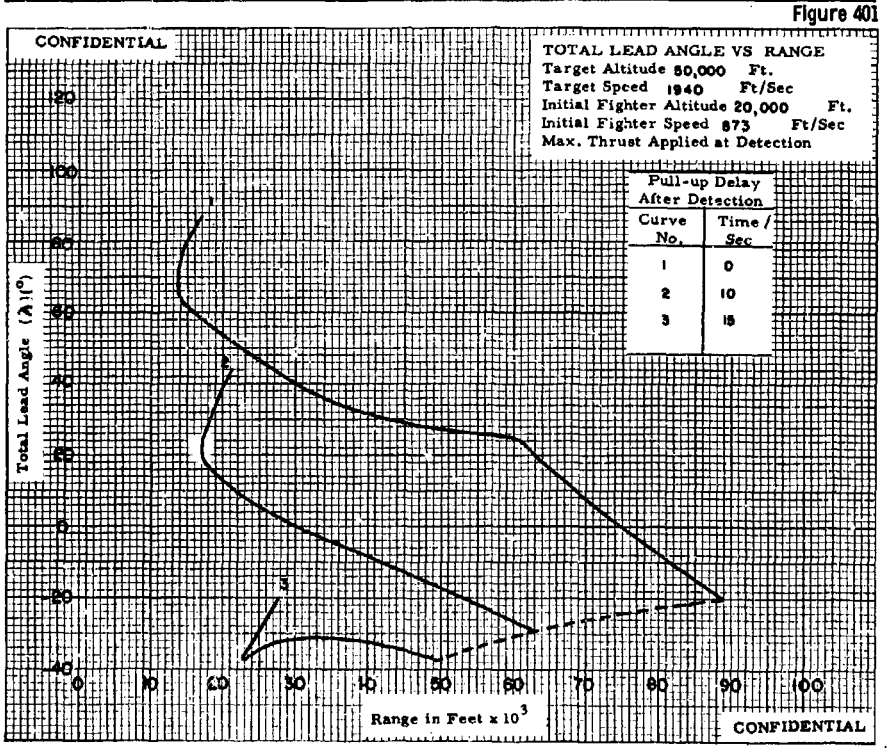
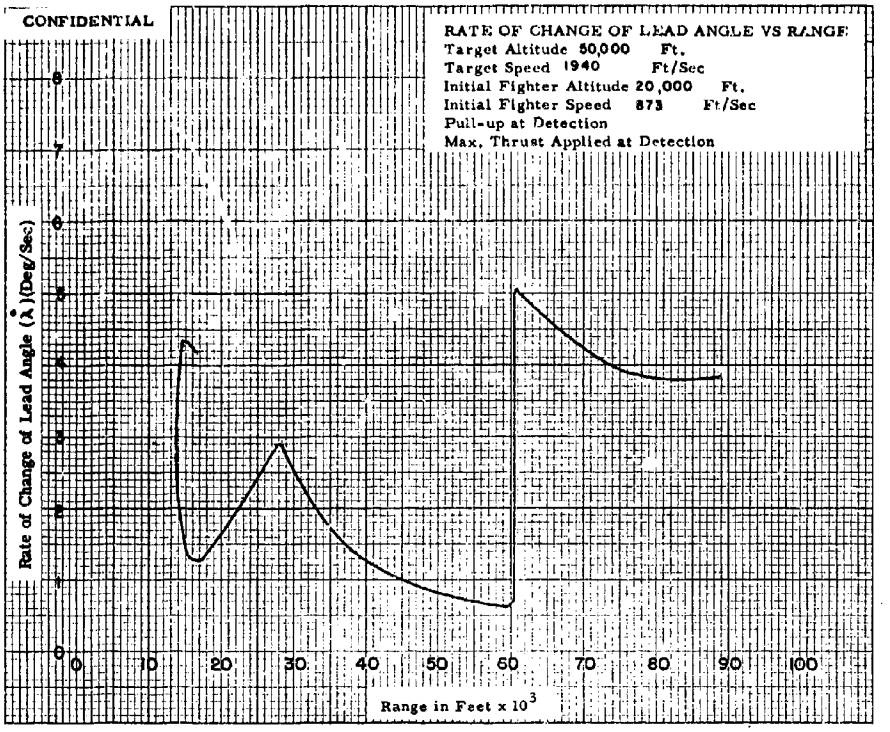


Figure 402


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
0
1
2
3
4
5
6
7
8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

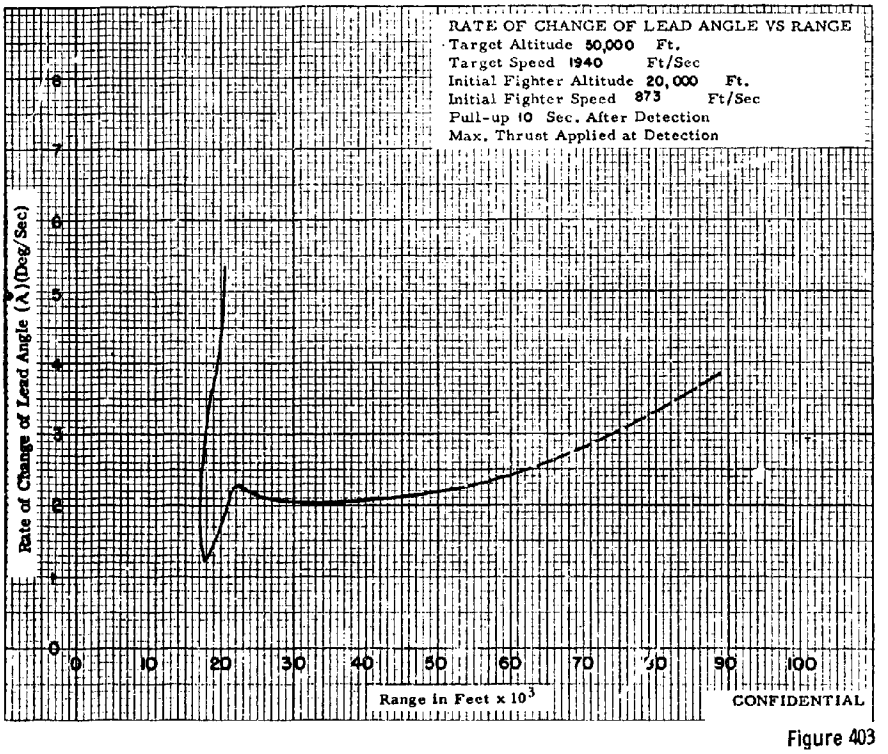

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
0
1
2
3
4
5
6
7
8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 403

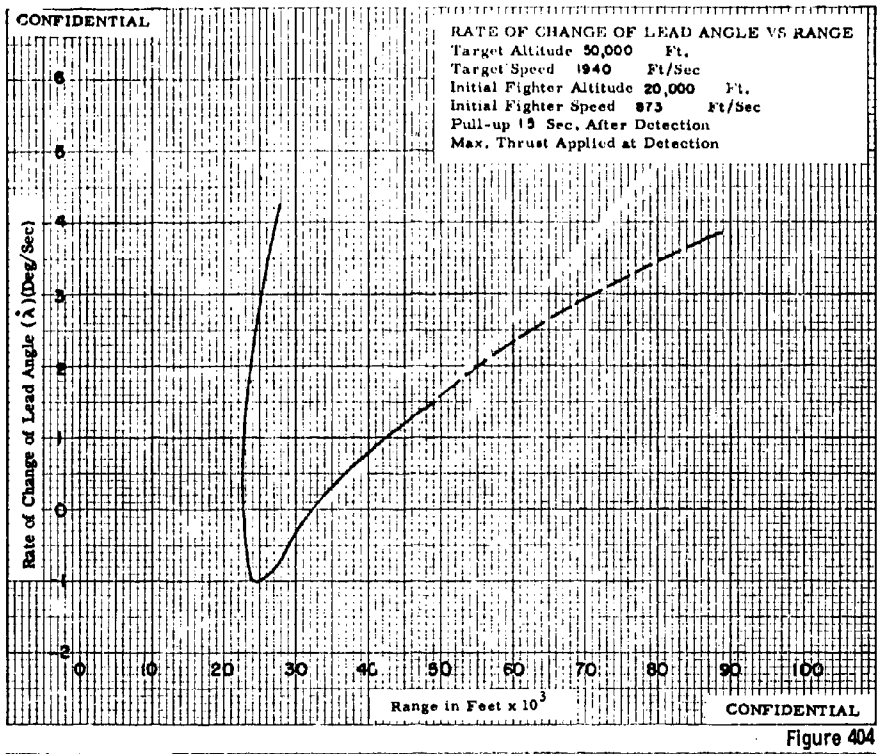


Figure 404

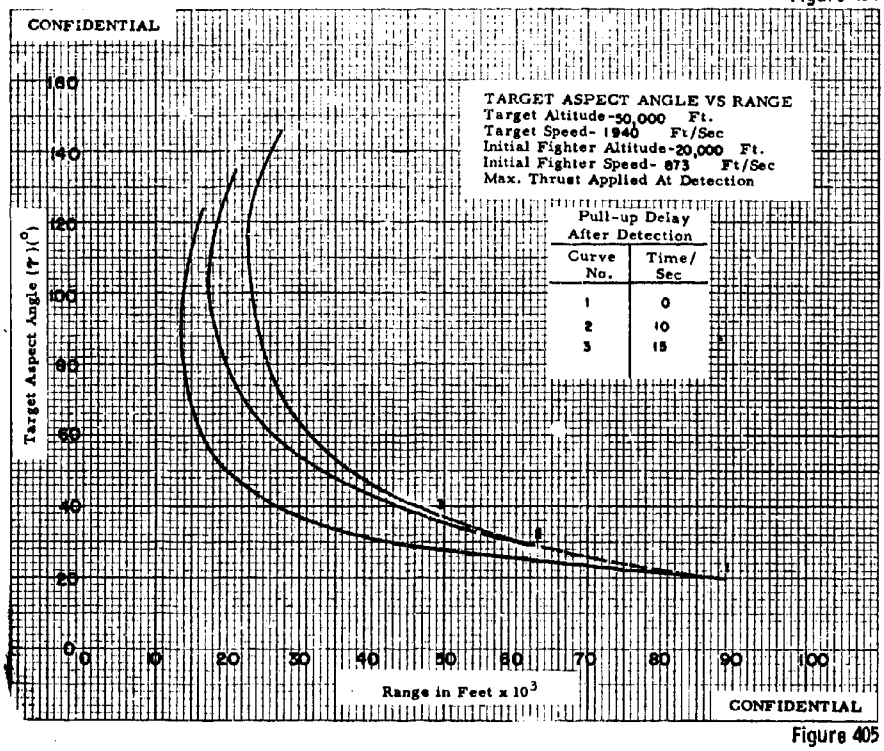


Figure 405

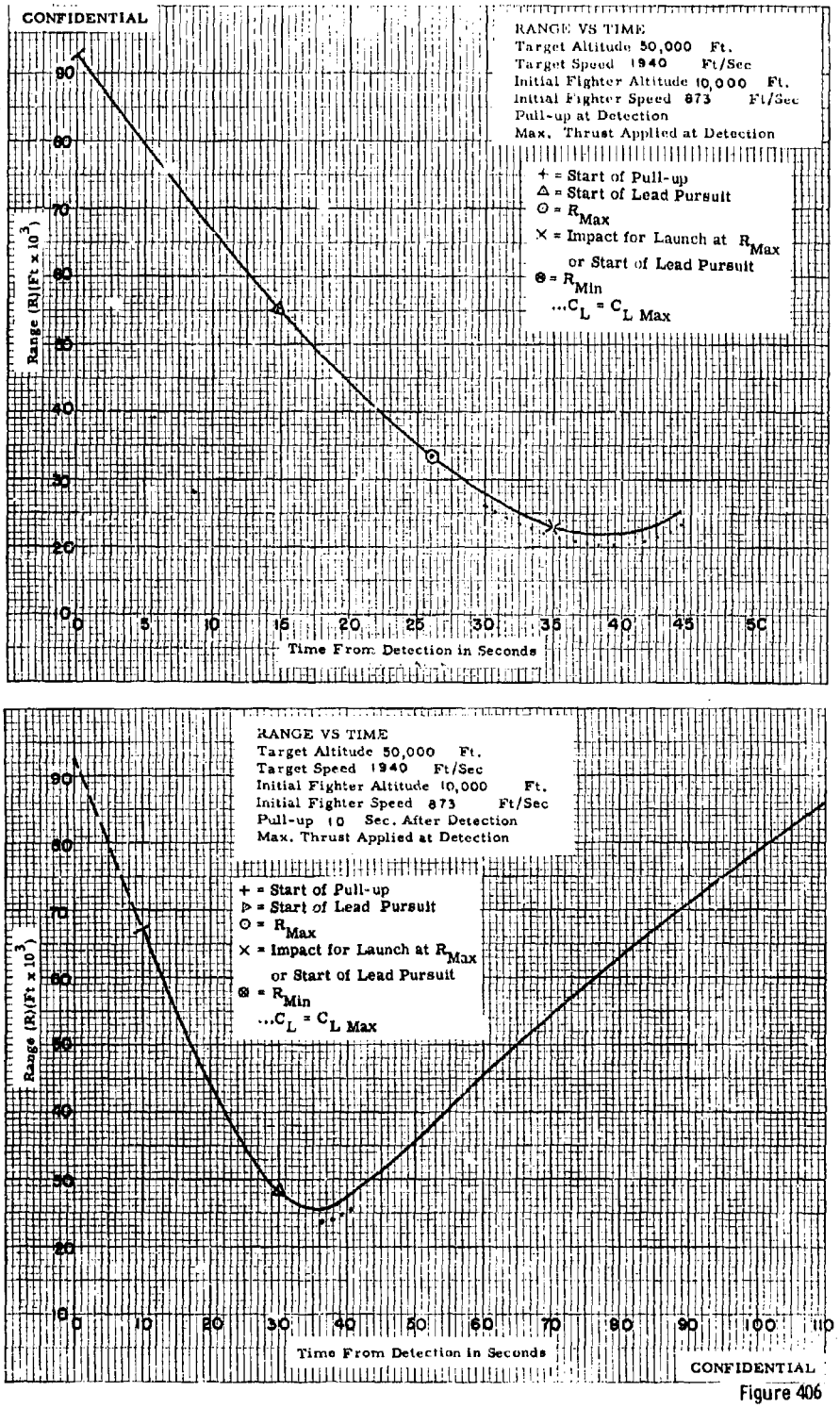

CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
Δ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
90
80
70
60
50
40
30
20
10
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
100
110
Time From Detection in Seconds
CONFIDENTIAL

Figure 406

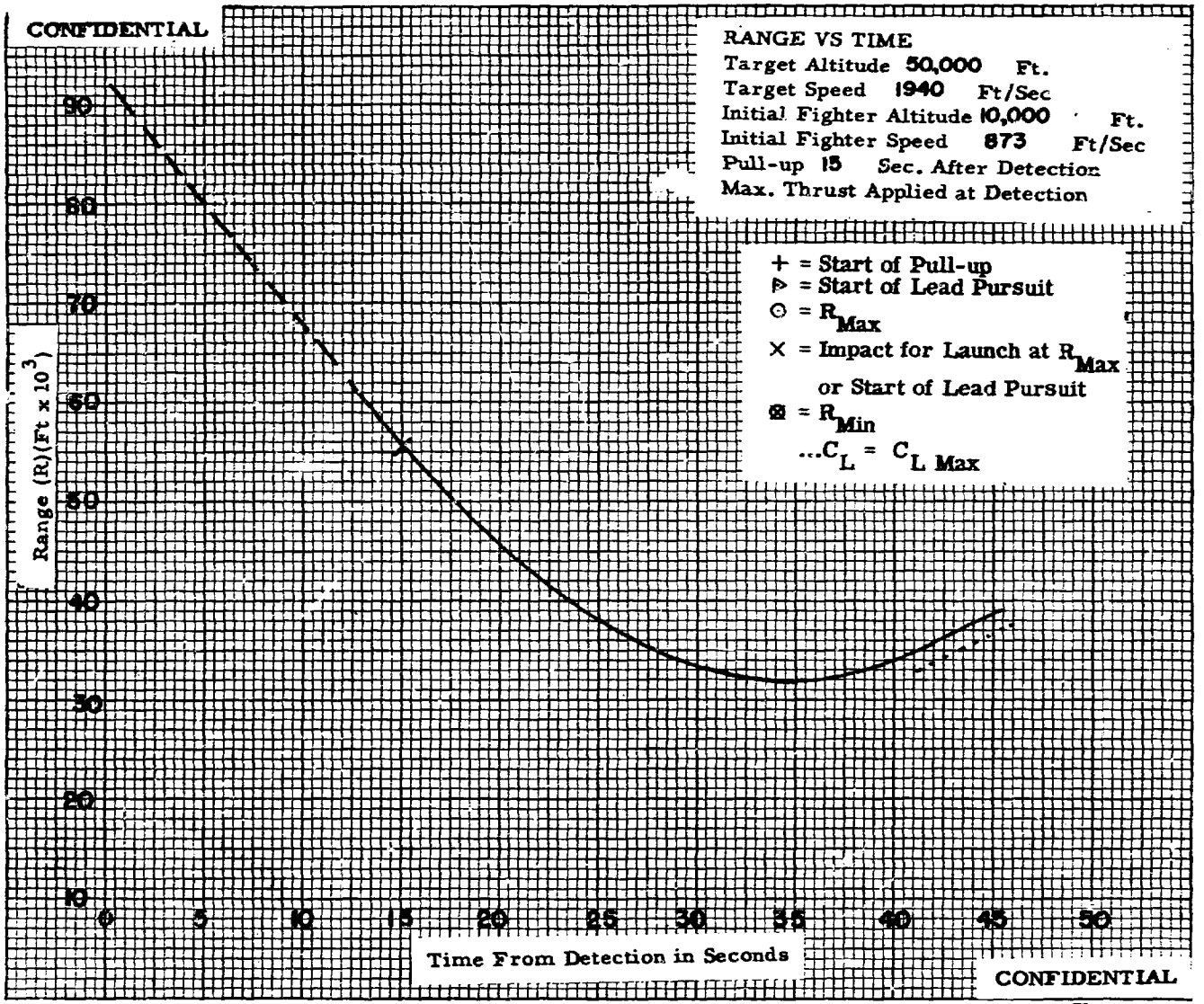
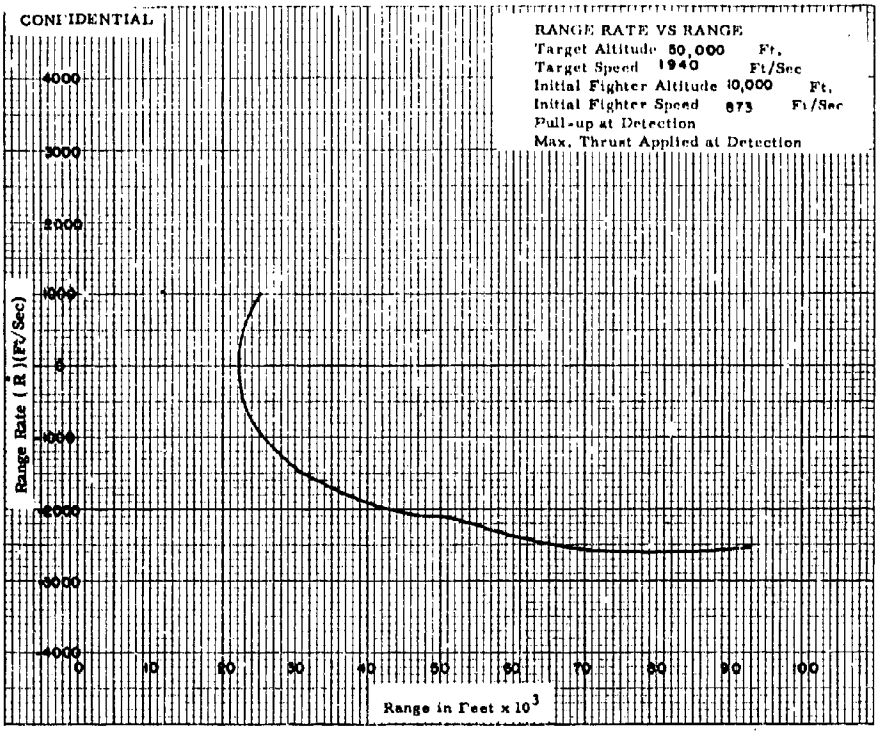

CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
⊳ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
90
80
70
60
50
40
30
20
10
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
CONFIDENTIAL

Figure 407


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

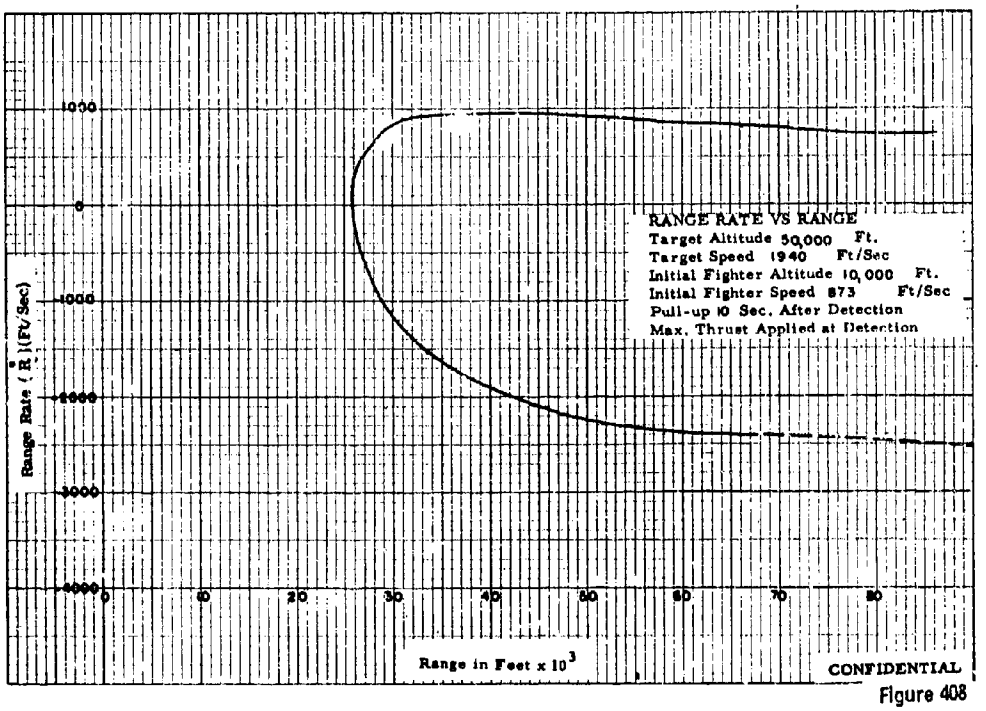

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

Figure 408

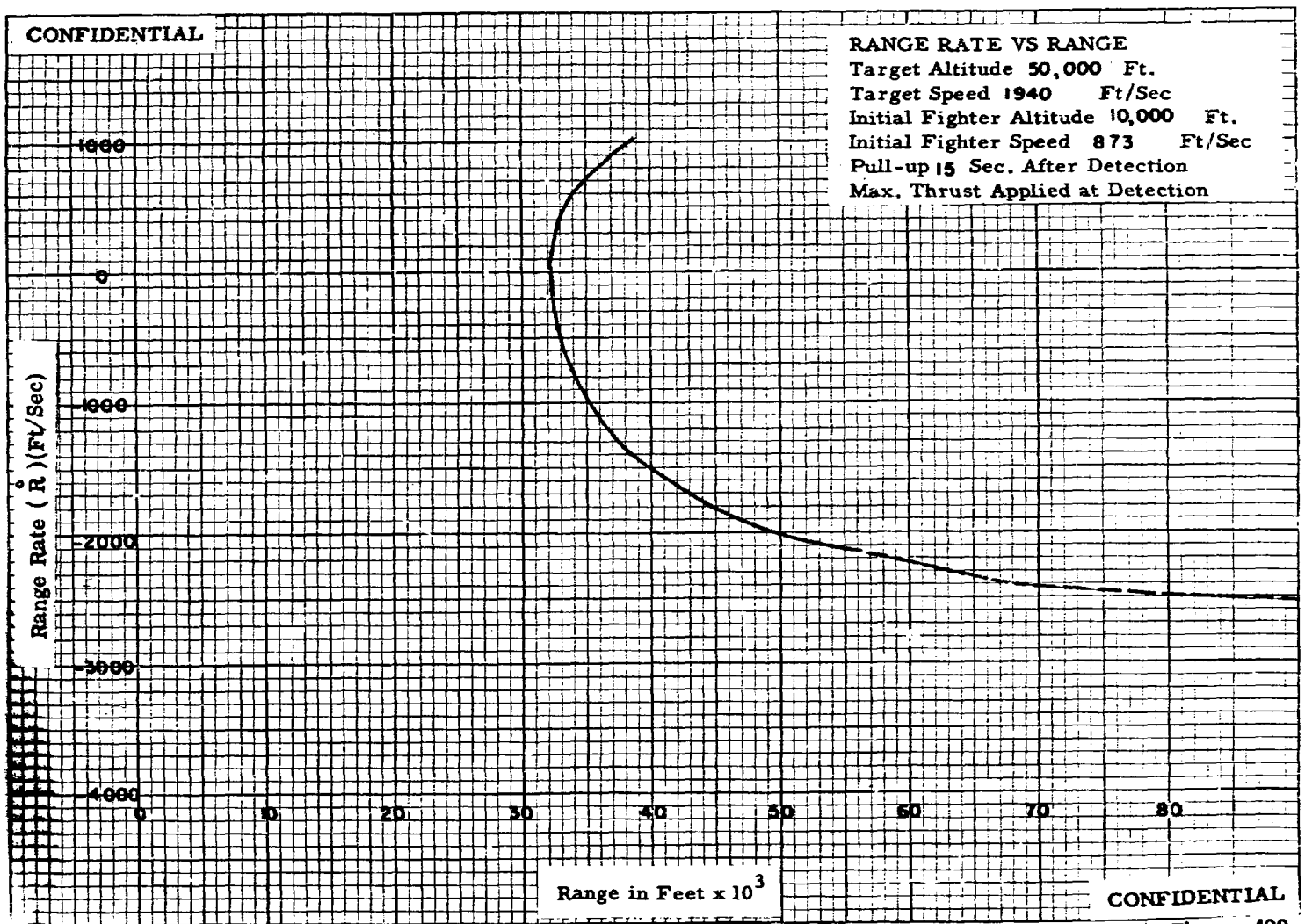
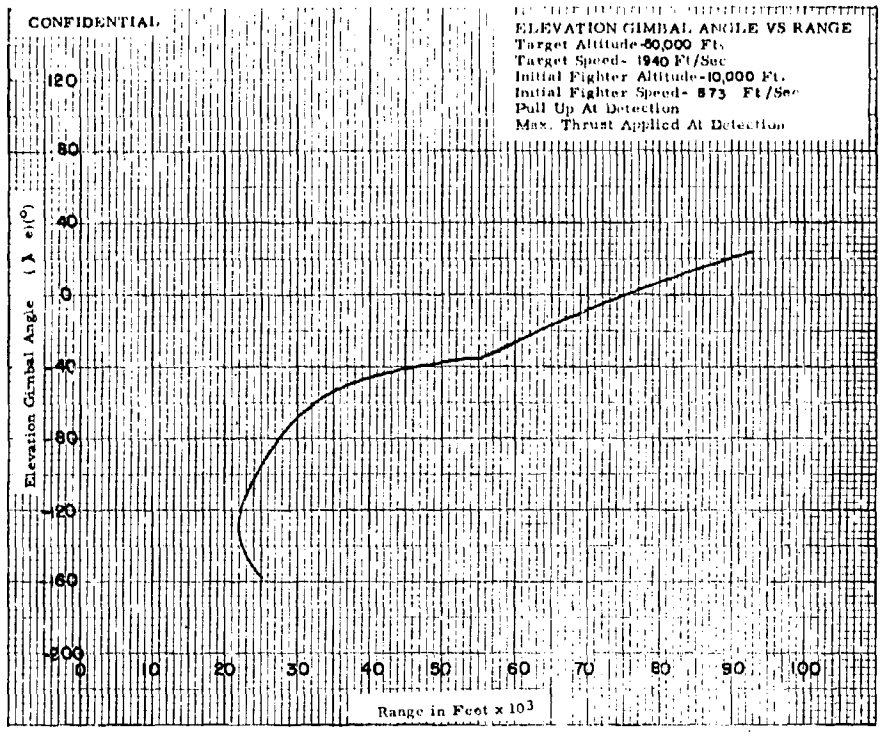

CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
1000
0
-1000
-2000
-3000
-4000
Range Rate (Ṙ) (Ft/Sec)
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 409


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull Up At Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λ e)(°)
120
80
40
0
-40
-80
-120
-160
-200
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

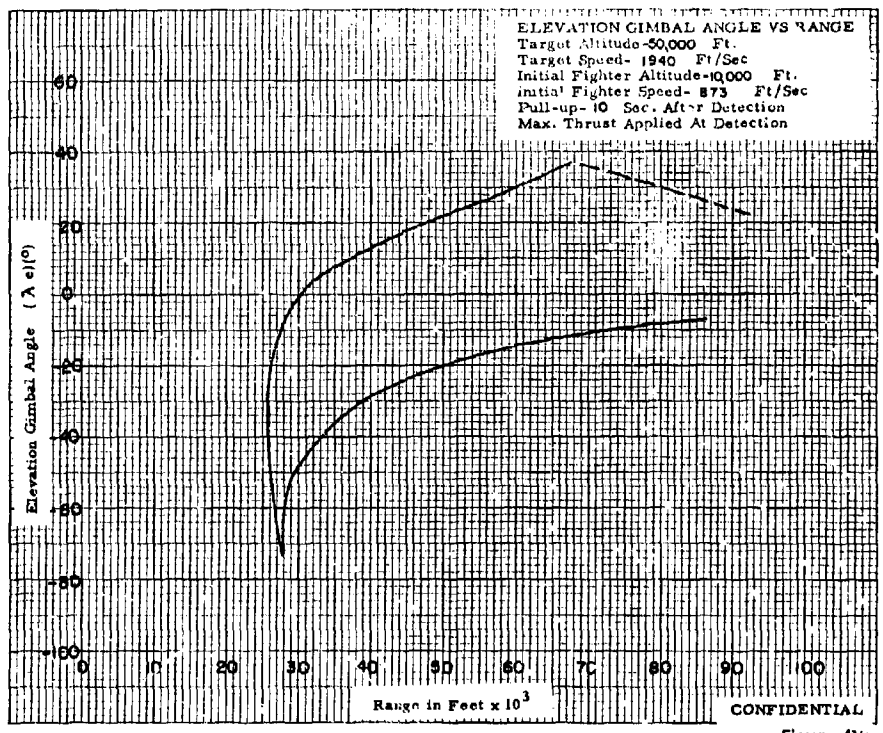

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λ e)(°)
60
40
20
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 410

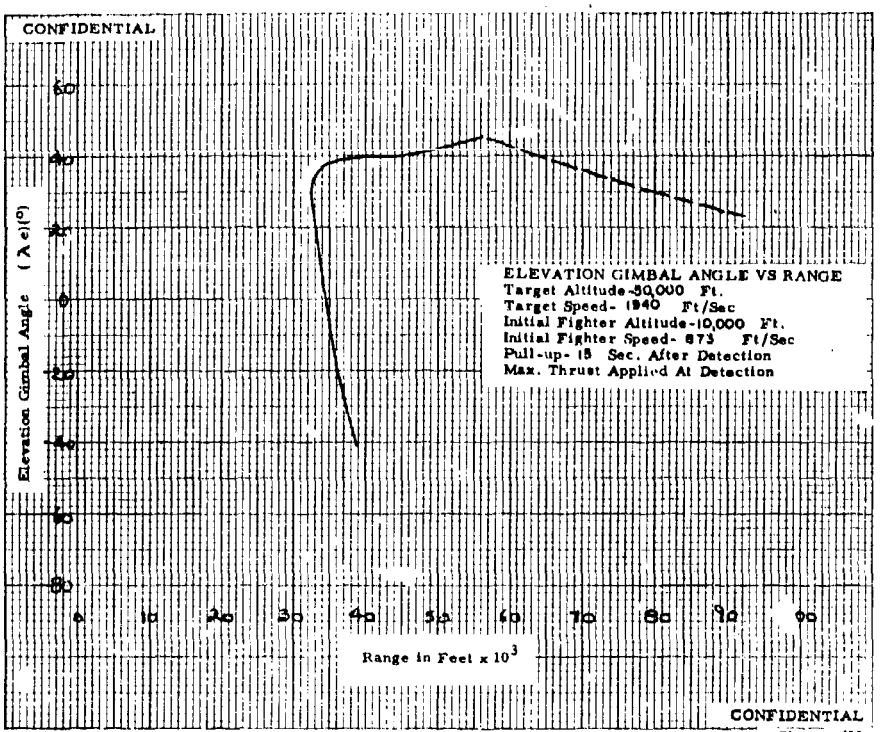


Figure 411

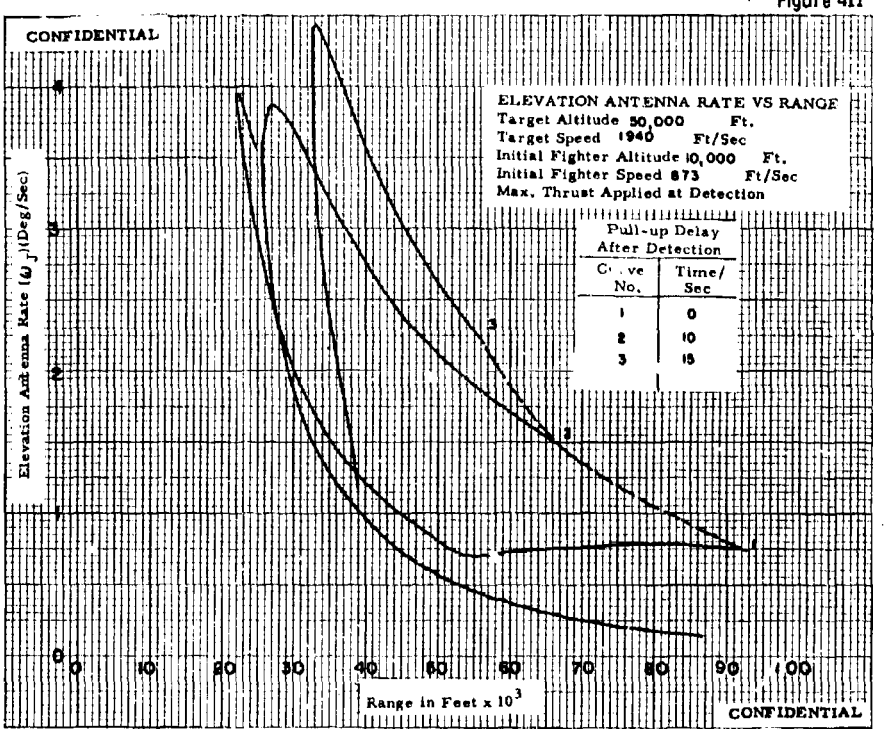


Figure 412

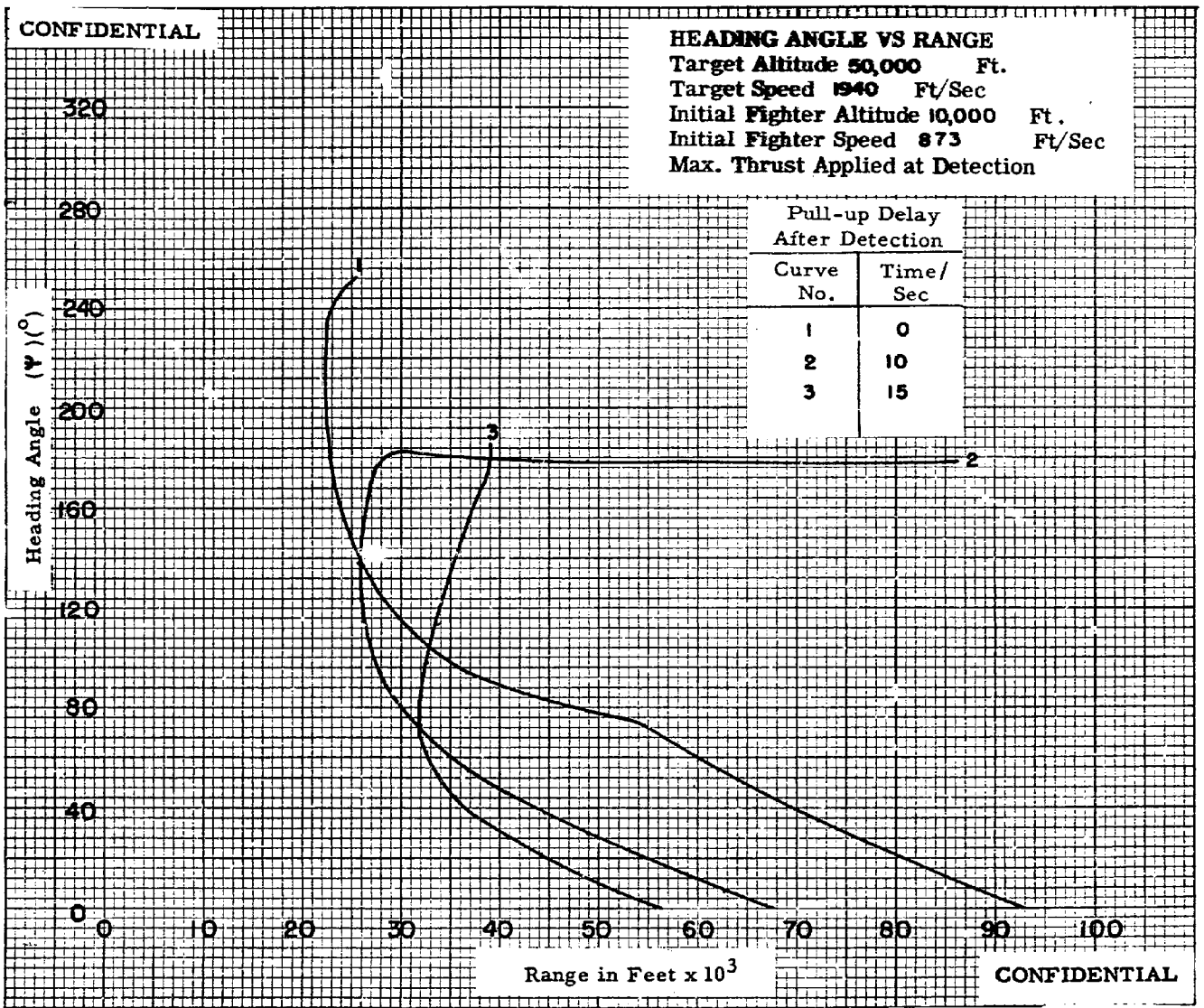
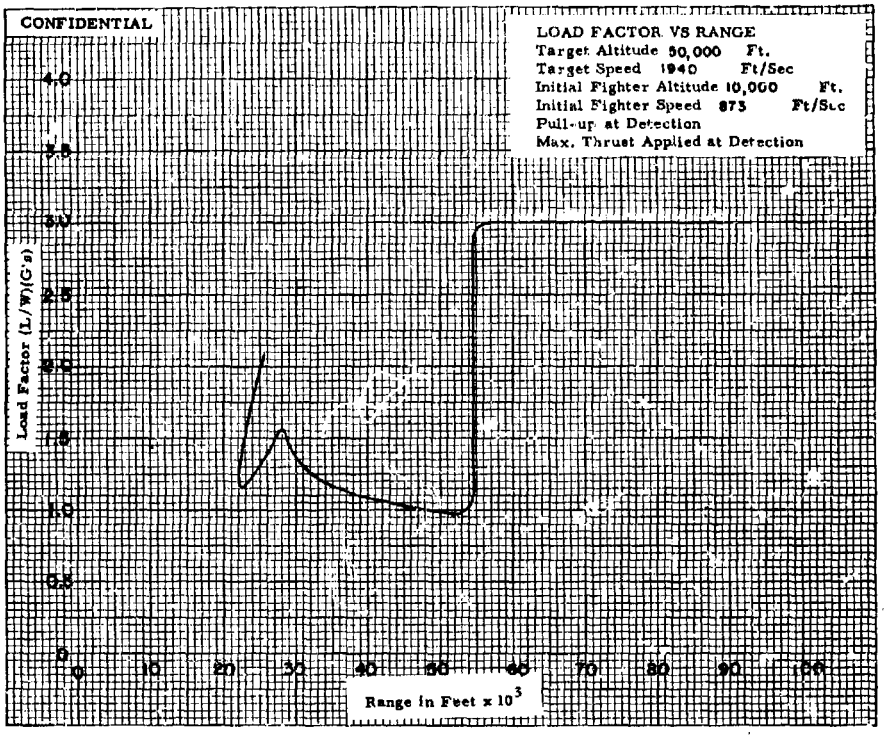

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
3 | 15
Heading Angle (Ψ)(°)
320
280
240
200
160
120
80
40
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 413


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

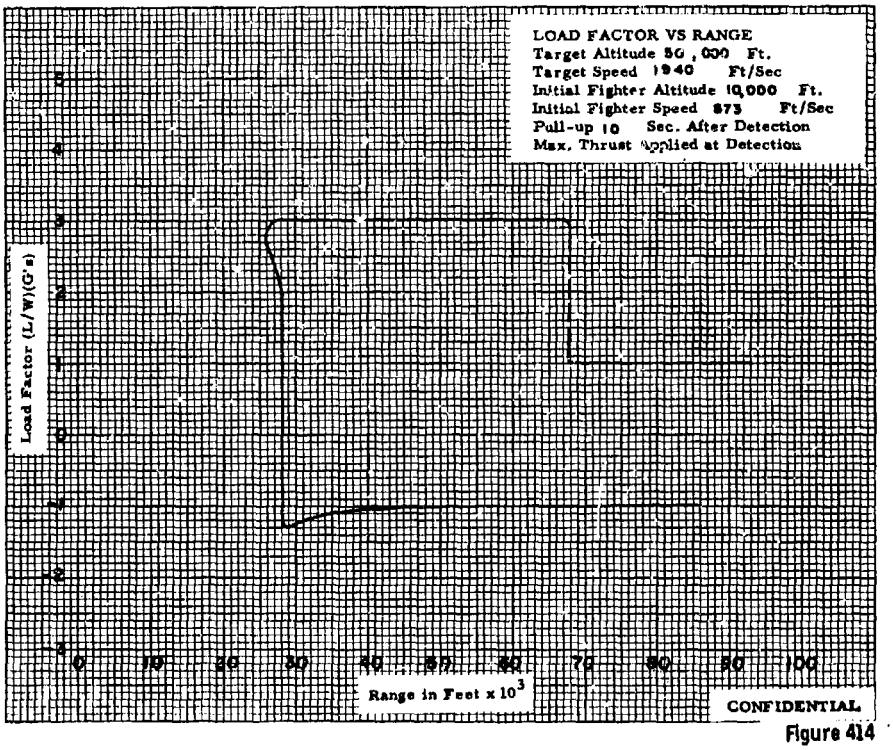

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
5
4
3
2
1
0
-1
-2
-3
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 414

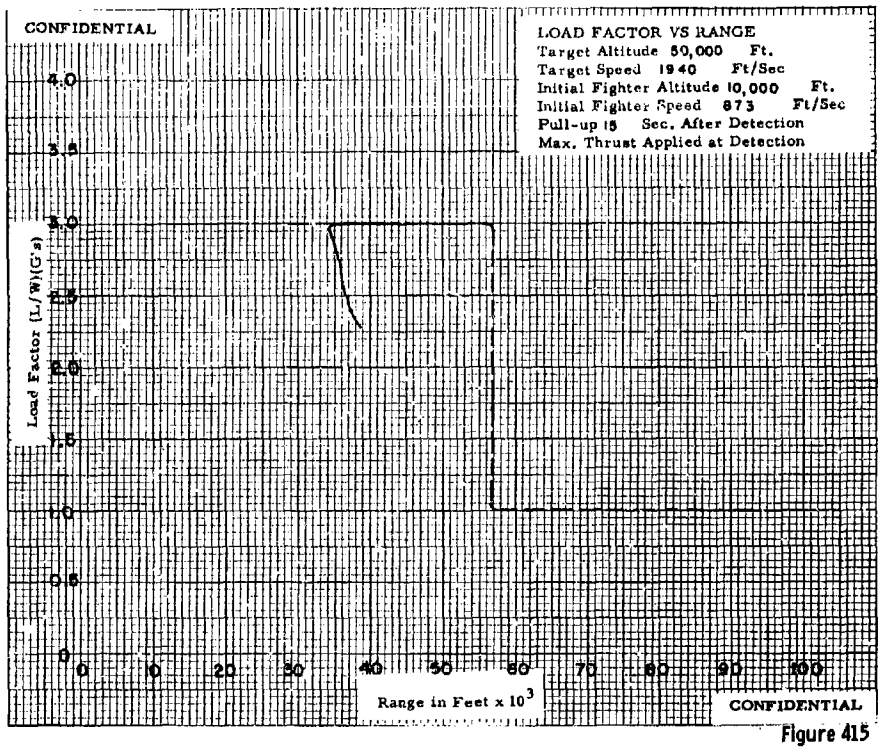


Figure 415

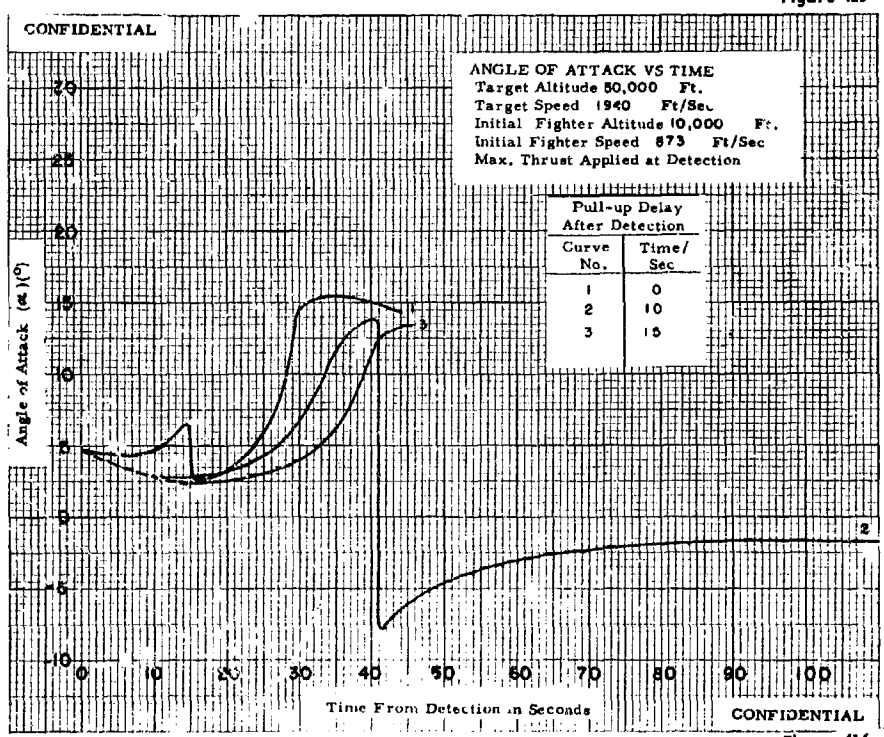
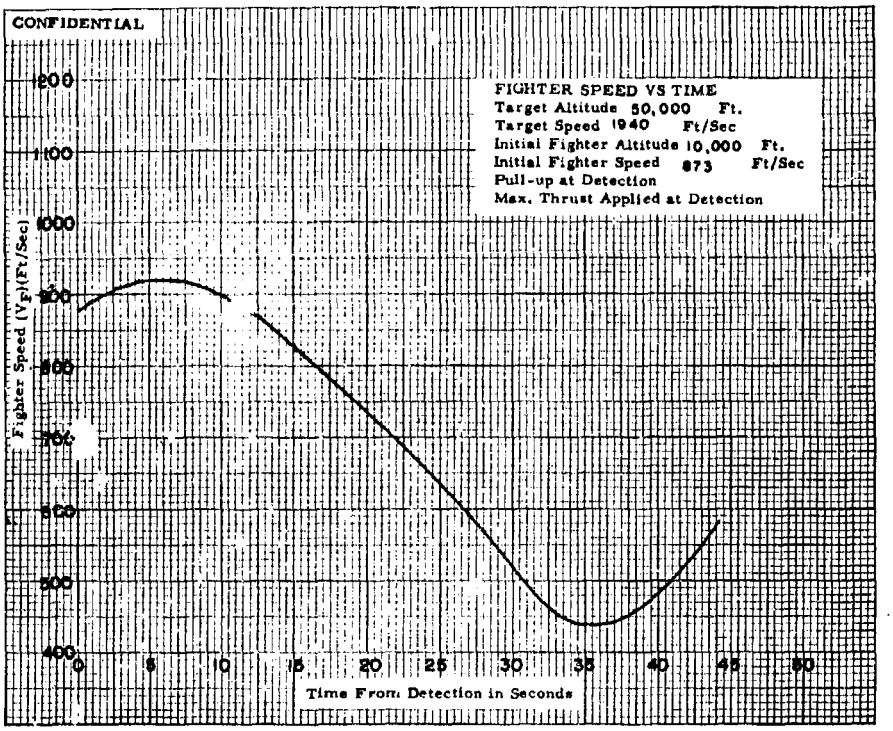


Figure 416


FIGHTER SPEED VS TIME
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Fighter Speed (V_F)(Ft/Sec)
1200
1100
1000
900
800
700
600
500
400
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds

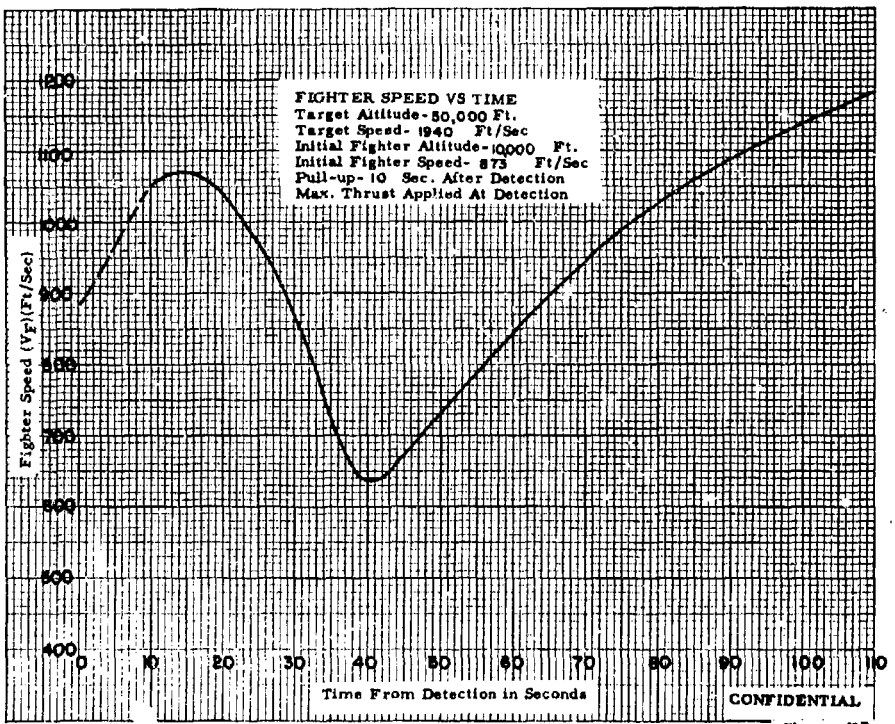

FIGHTER SPEED VS TIME
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-10000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Speed (V_F)(Ft/Sec)
1200
1100
1000
900
800
700
600
500
400
0
10
20
30
40
50
60
70
80
90
100
110
Time From Detection in Seconds

Figure 417

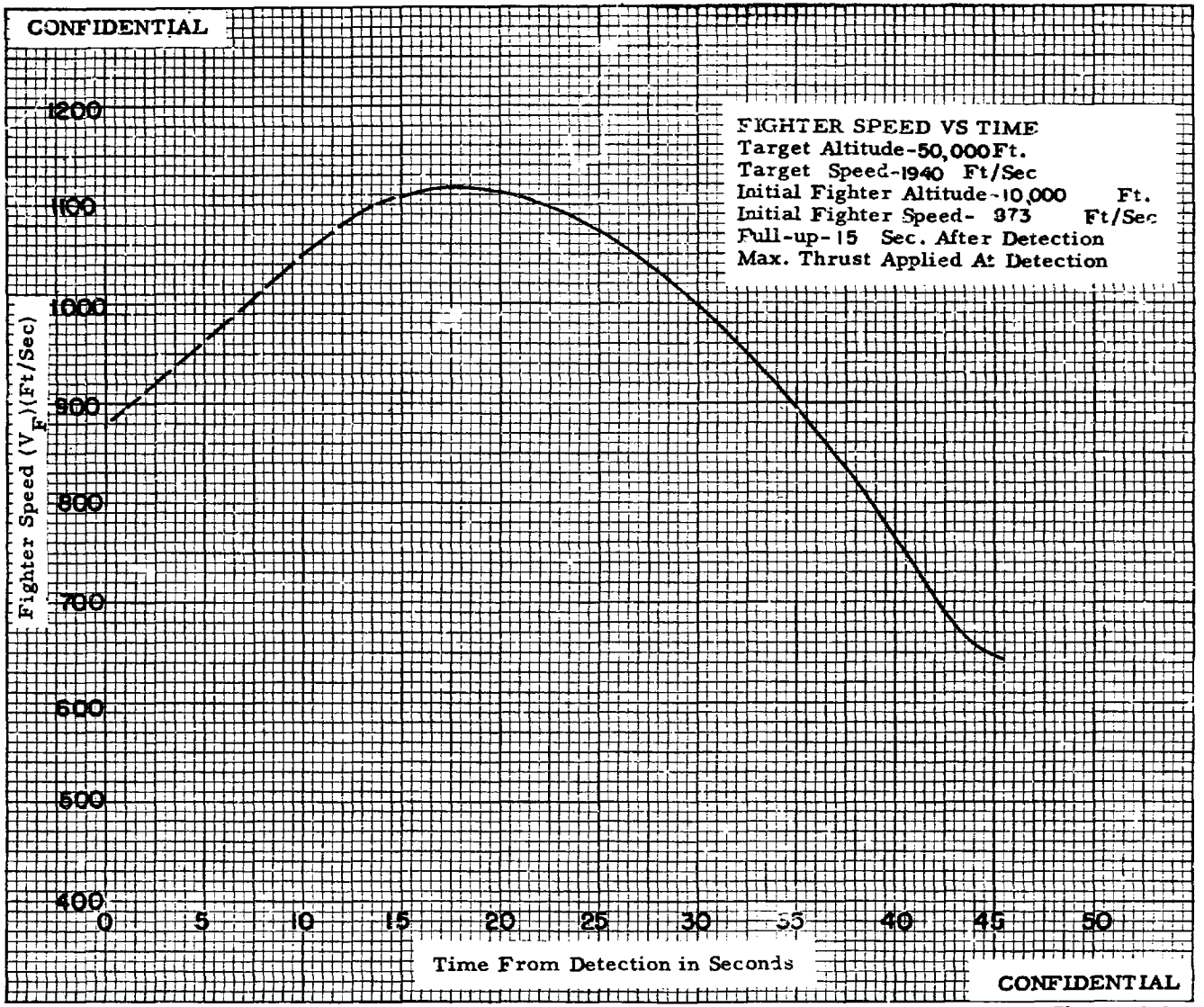
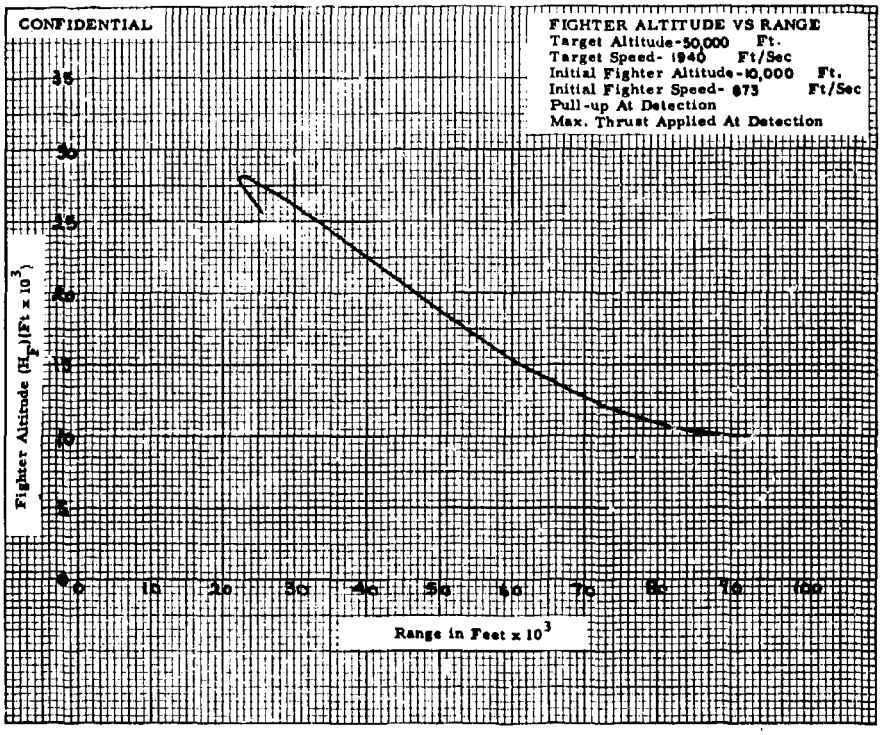

CONFIDENTIAL
FIGHTER SPEED VS TIME
Target Altitude-50,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 373 Ft/Sec
Full-up-15 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Speed (V_F)(Ft/Sec)
1200
1100
1000
900
800
700
600
500
400
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
CONFIDENTIAL

Figure 418


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up At Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3

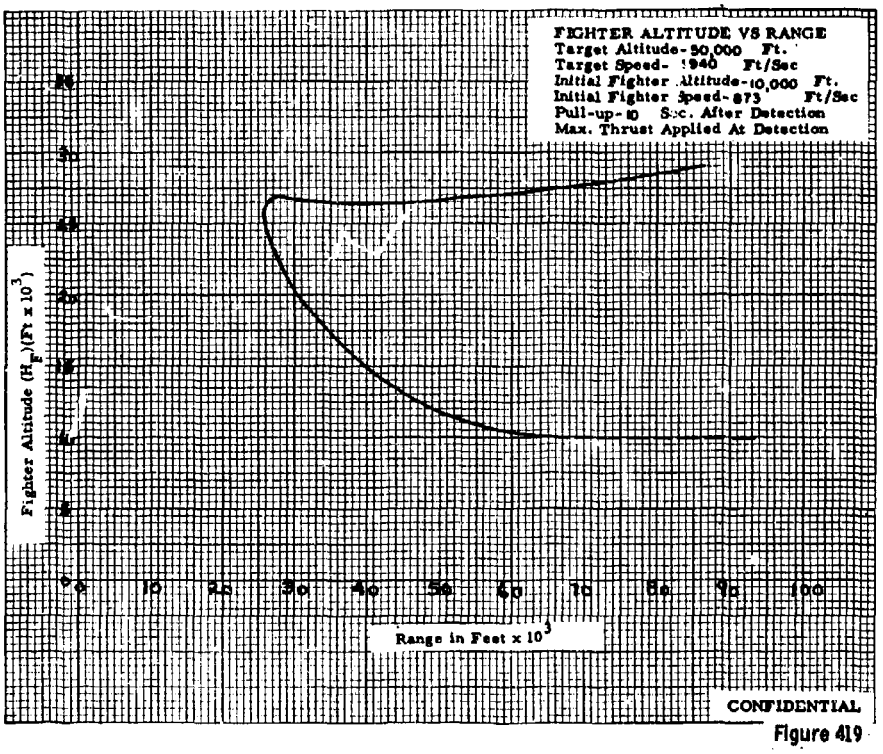

FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed-873 Ft/Sec
Pull-up-10 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3
CONFIDENTIAL

Figure 419

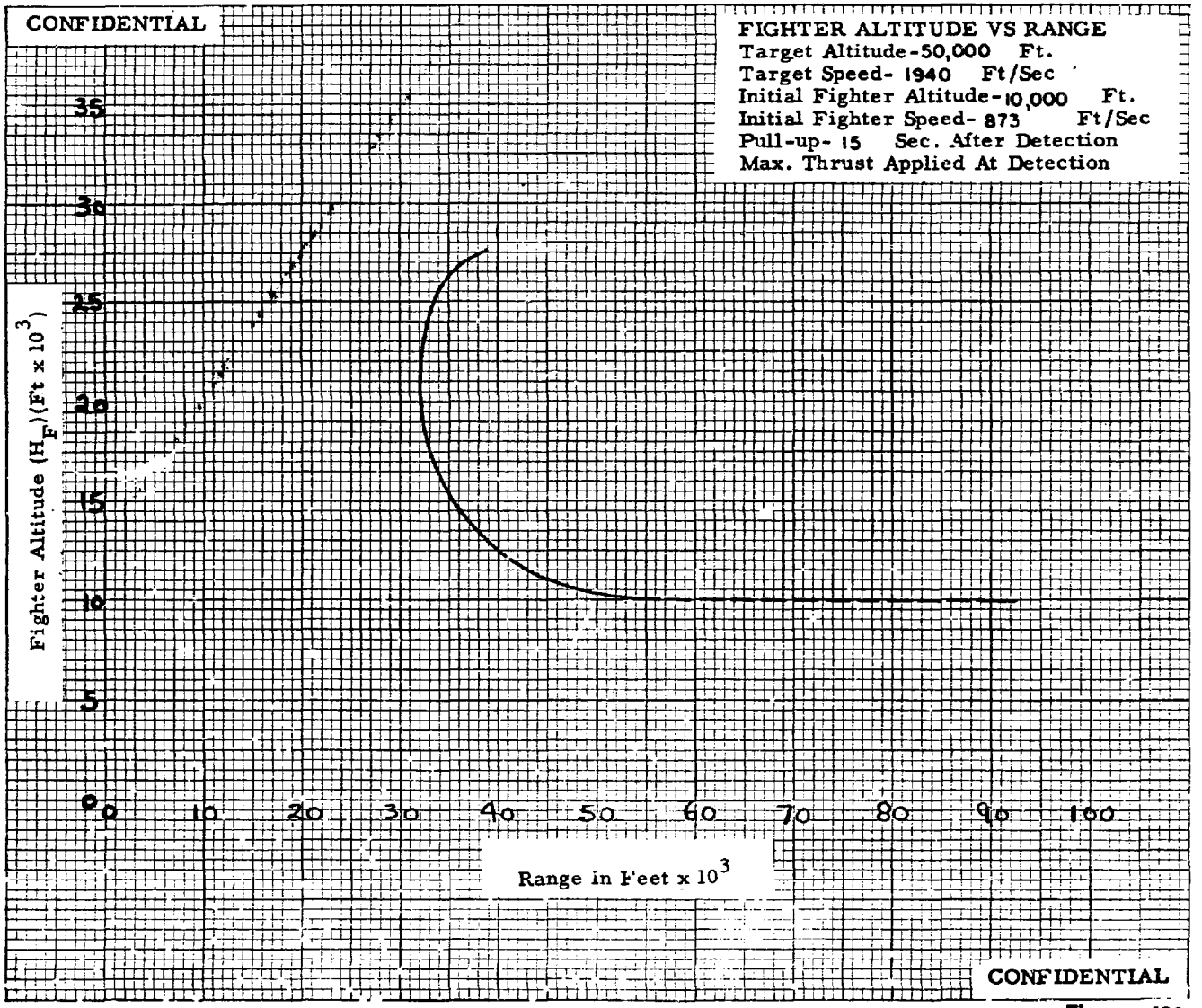
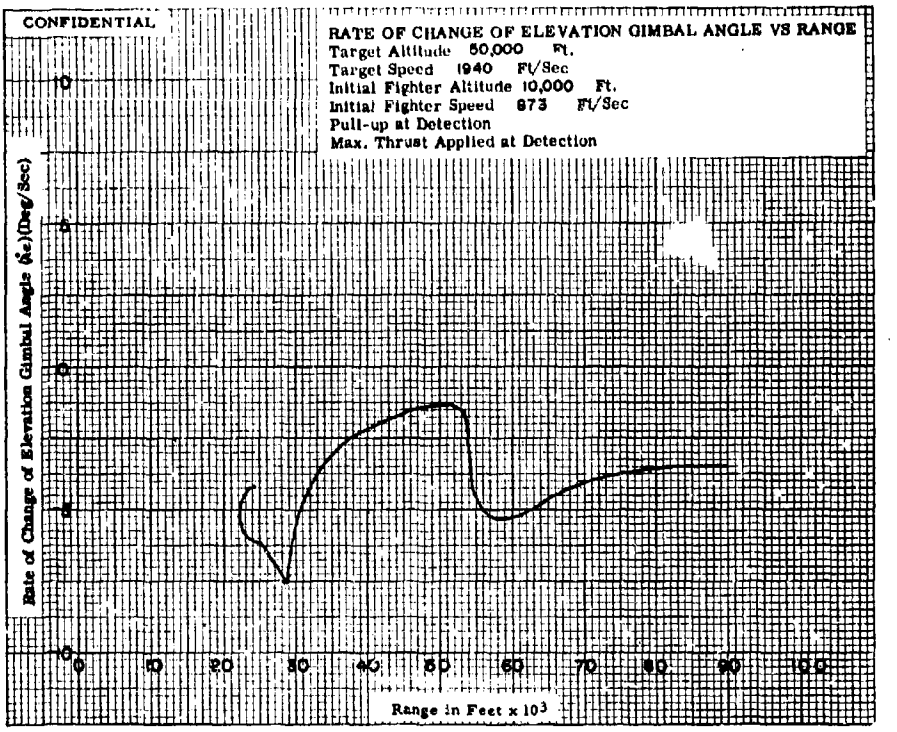

CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 15 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 420


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

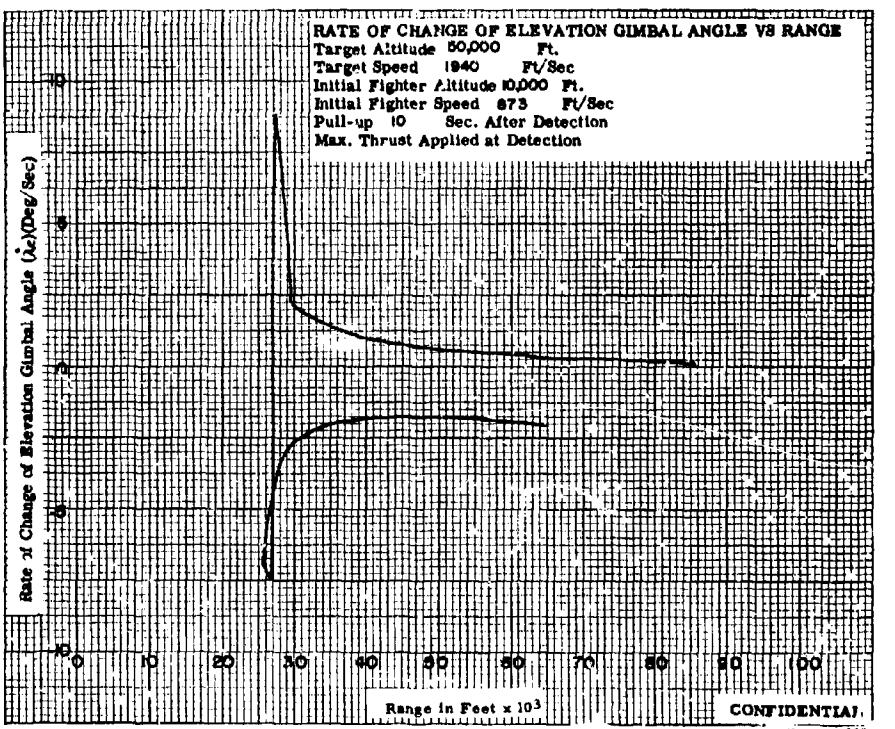

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 421

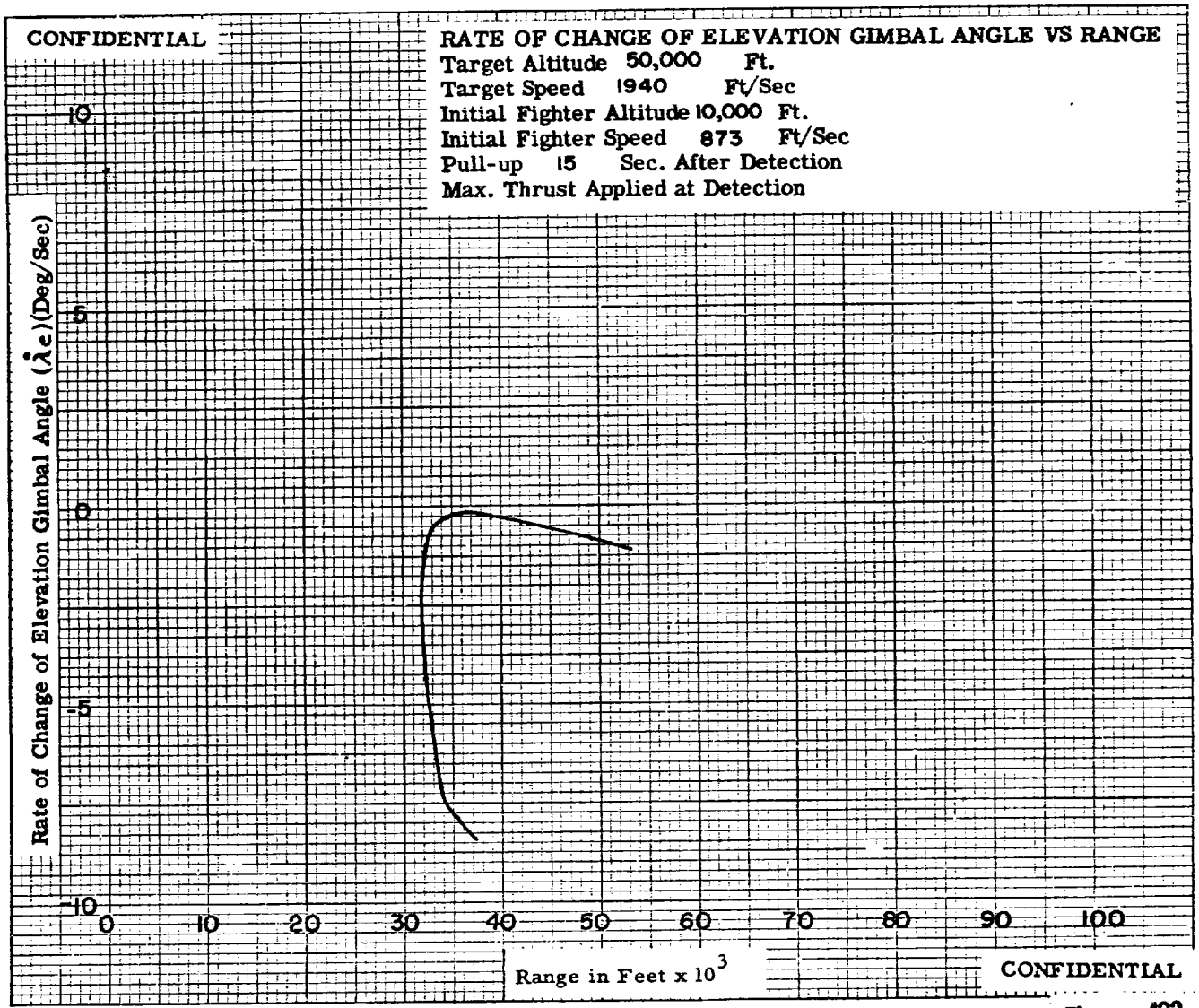
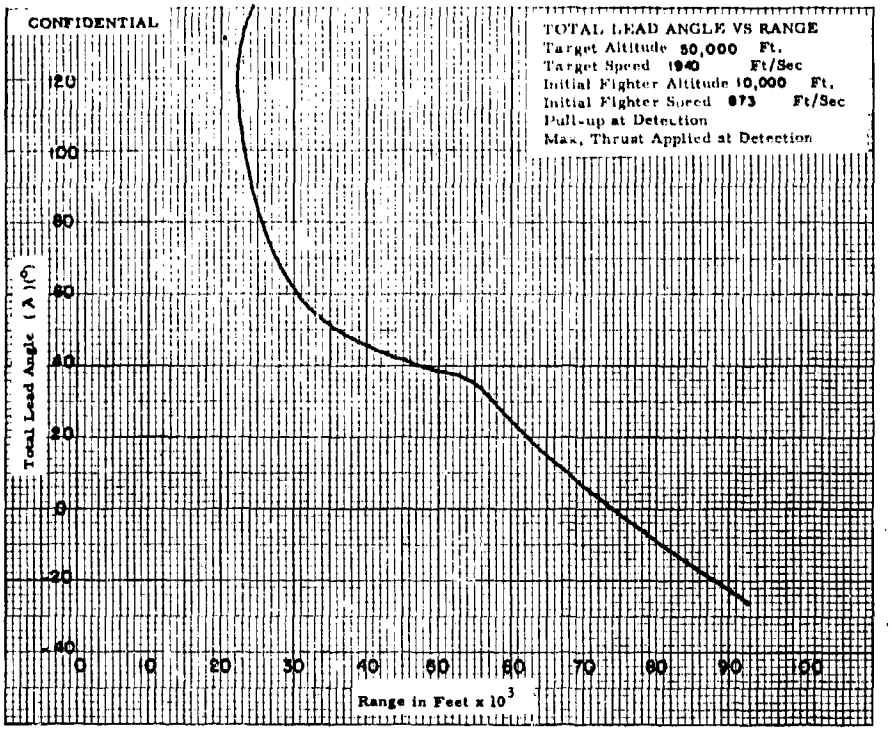

CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}e$)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 422


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Total Lead Angle (A)(°)
120
100
80
60
40
20
0
-20
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

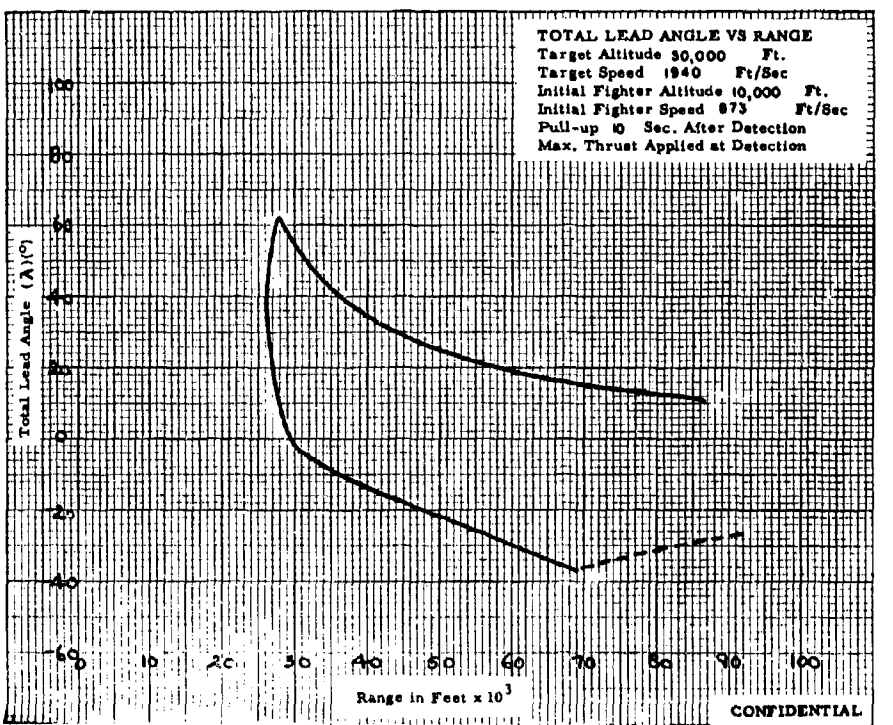

TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (A)(°)
100
80
60
40
20
0
-20
-40
-60
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 423

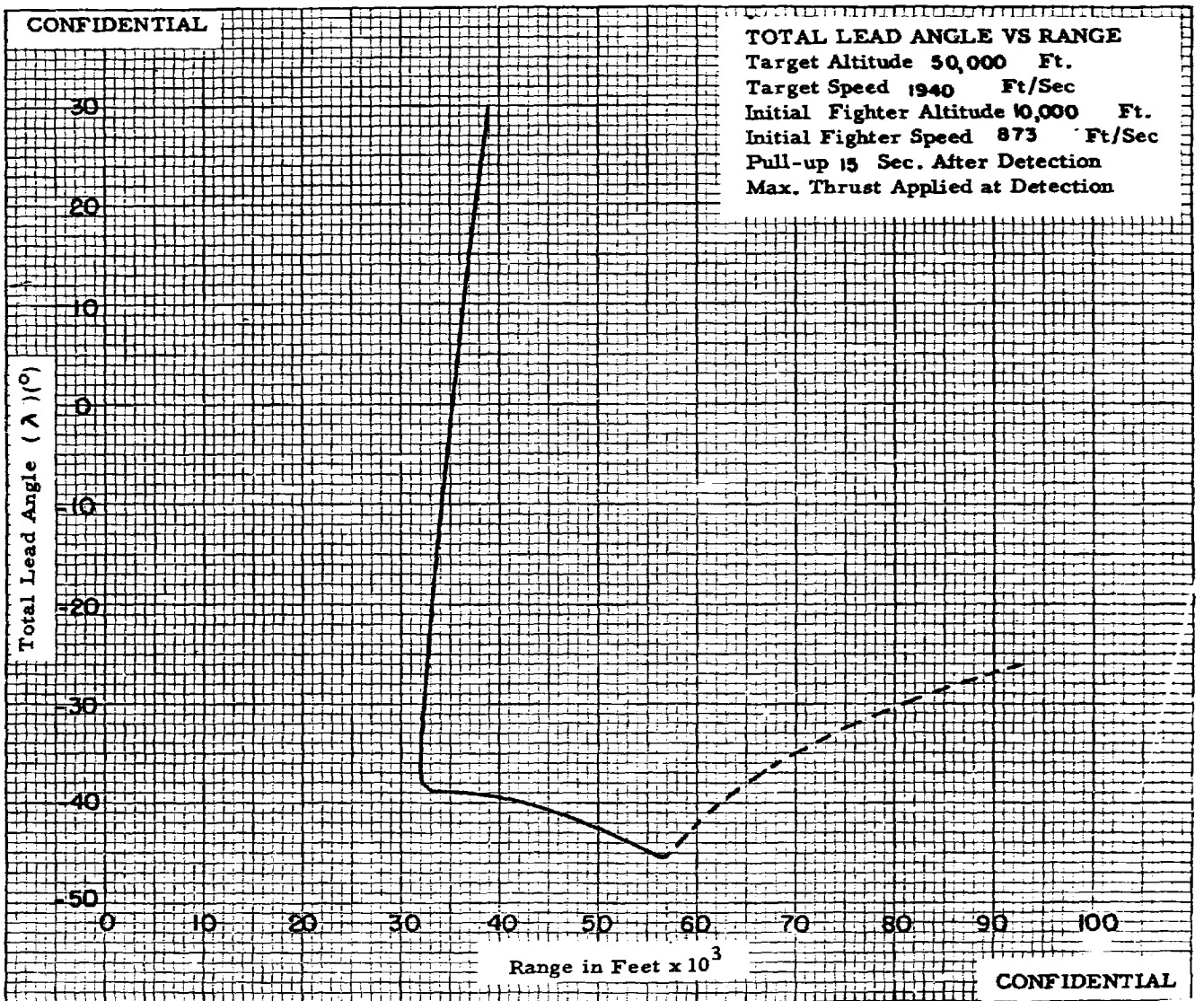
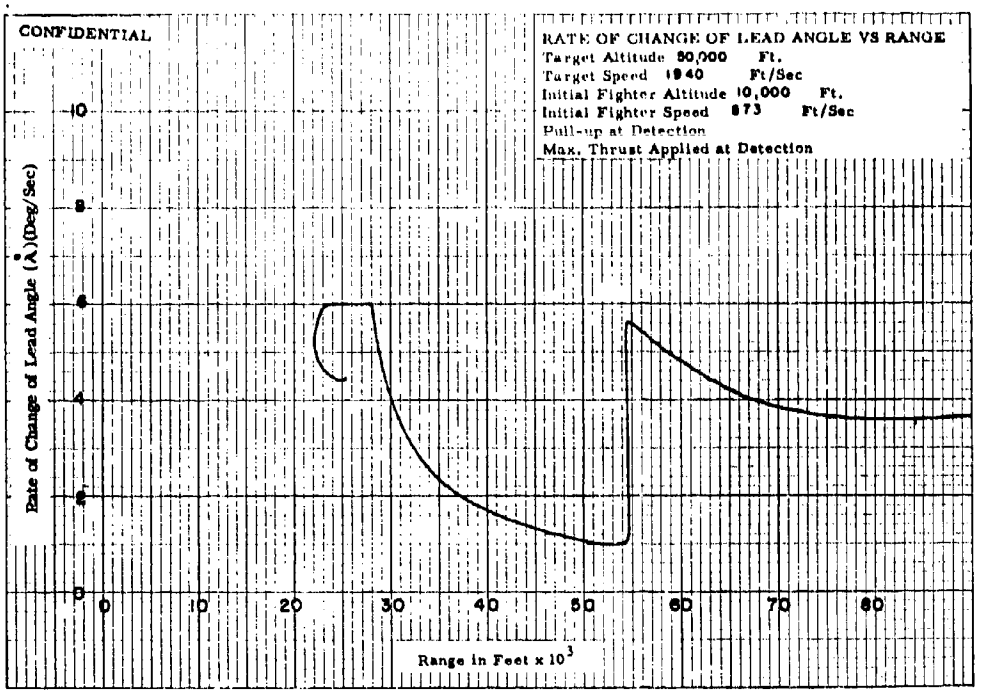

CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
30
20
10
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 424


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

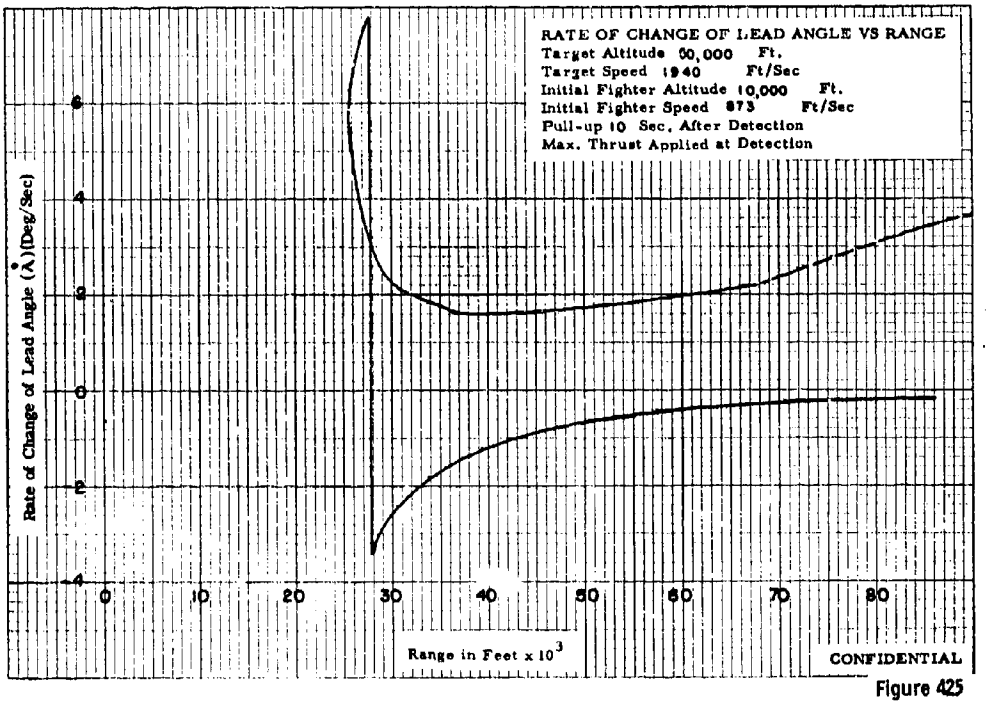

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
6
4
2
0
-2
-4
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 425

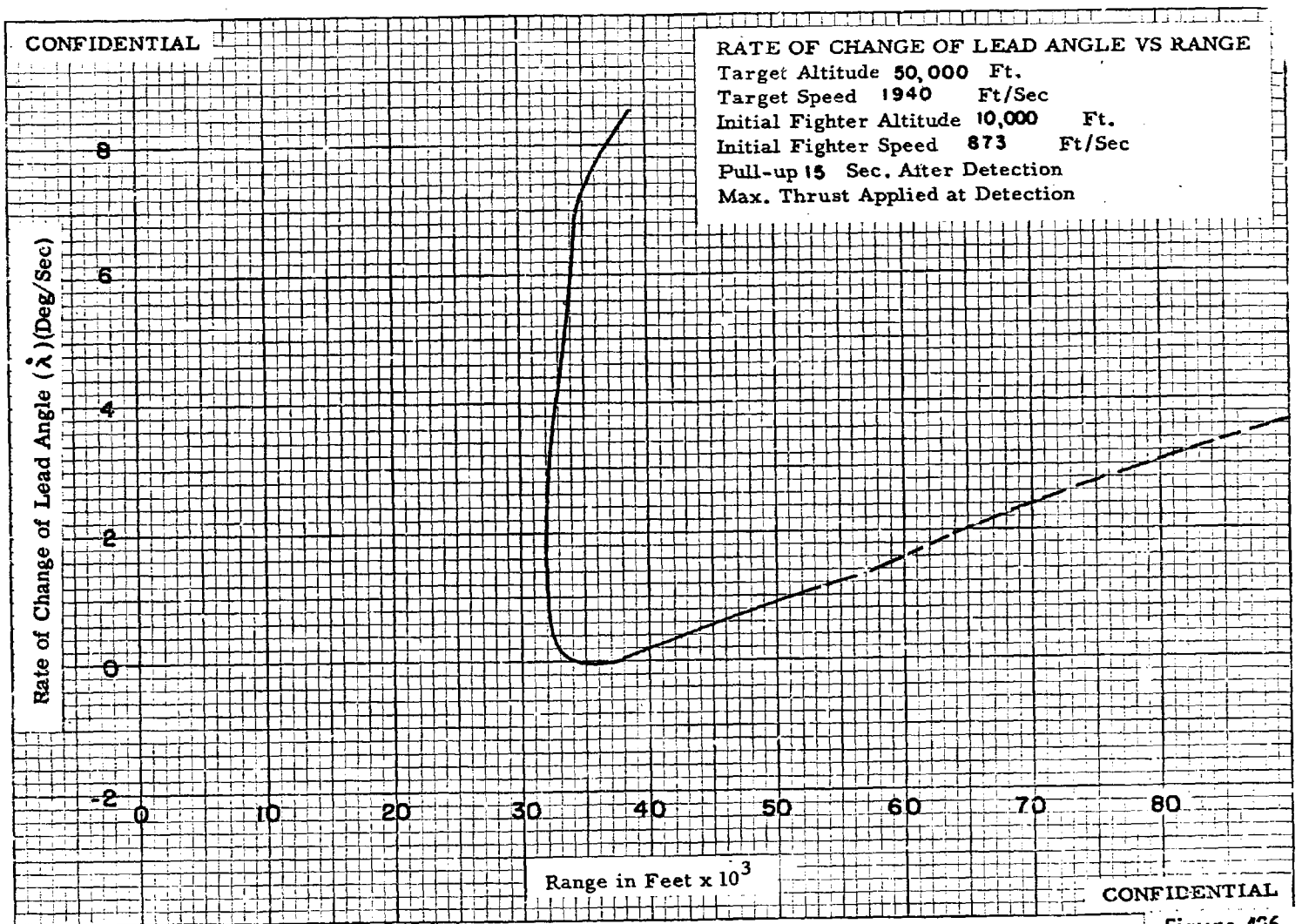
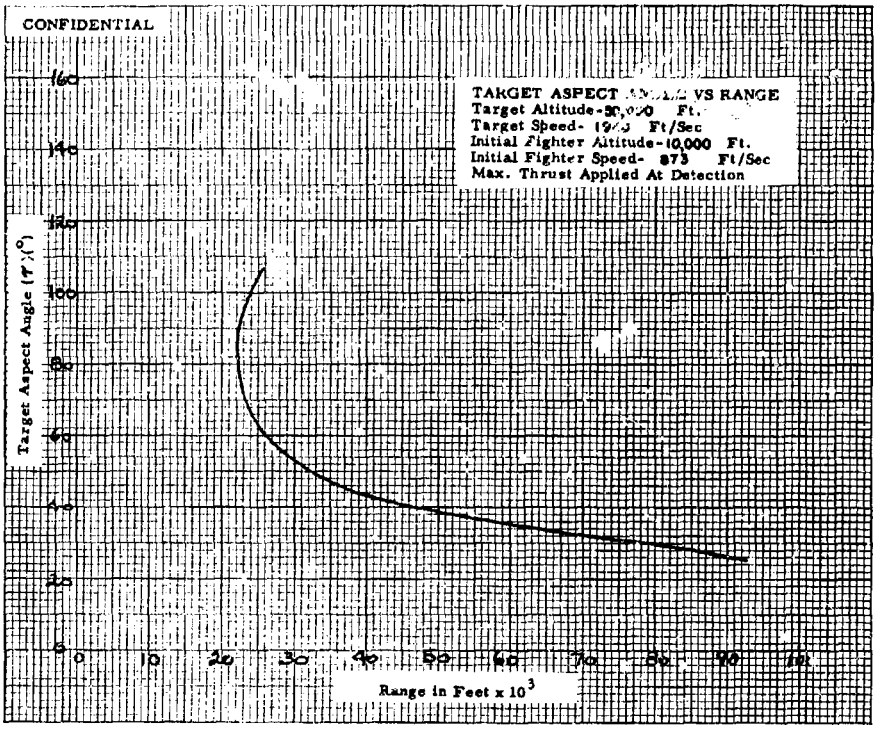

CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
8
6
4
2
0
-2
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 426


TARGET ASPECT ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 1973 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Max. Thrust Applied At Detection
Target Aspect Angle (ψ°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

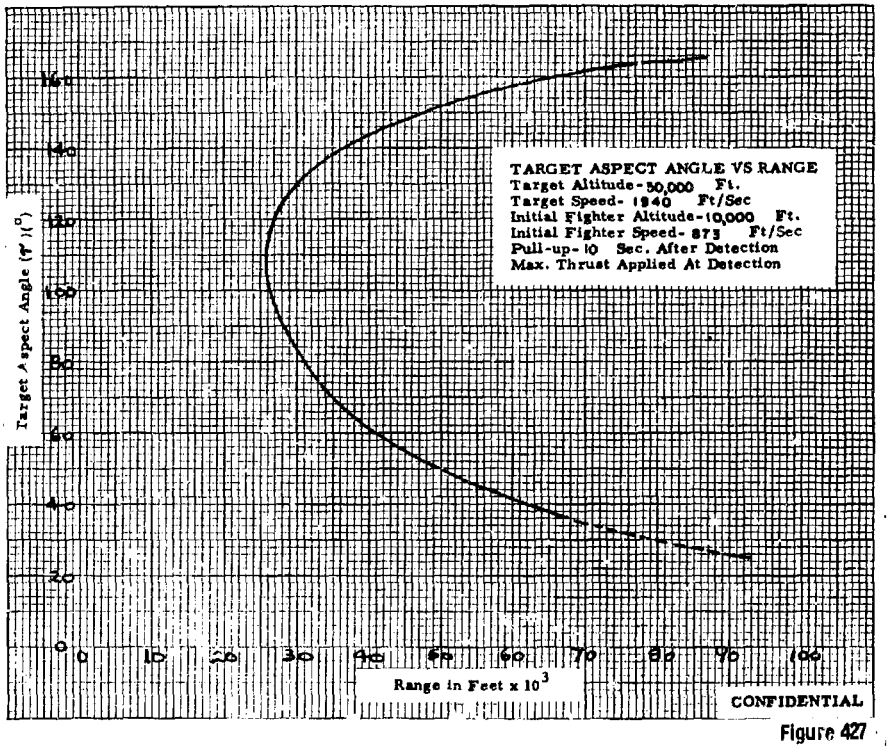
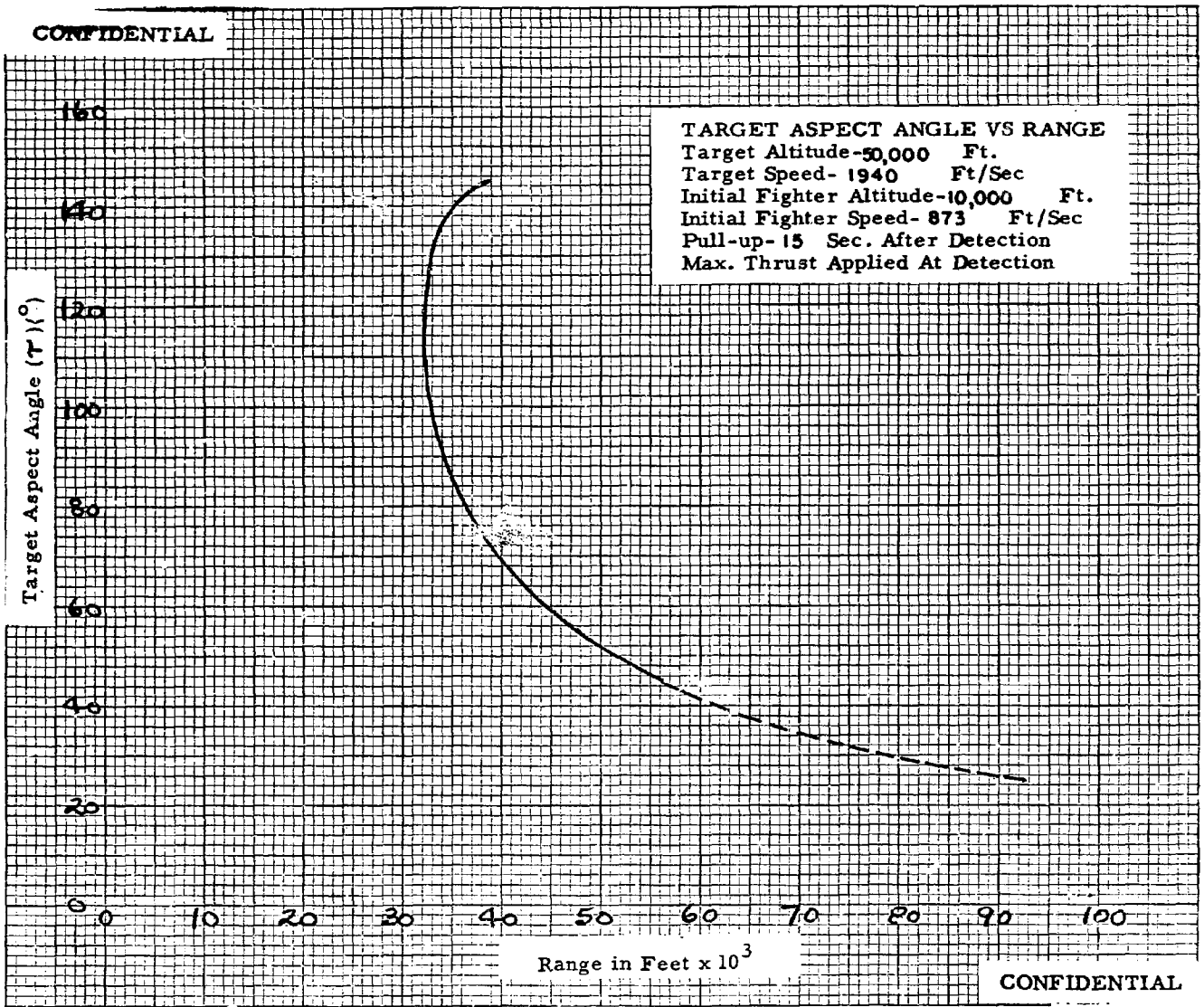

TARGET ASPECT ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 1840 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ψ°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

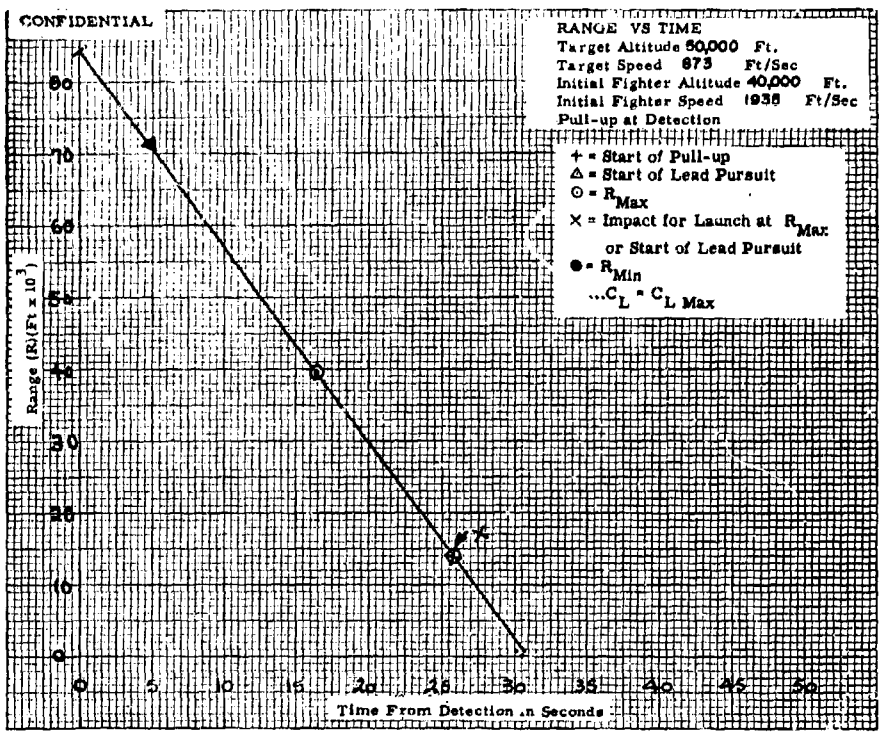
Figure 427

CONFIDENTIAL



CONFIDENTIAL

Figure 428


RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
Δ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
● = R Min ...C L = C L Max
Range (R)(Ft x 10³)
Time From Detection in Seconds

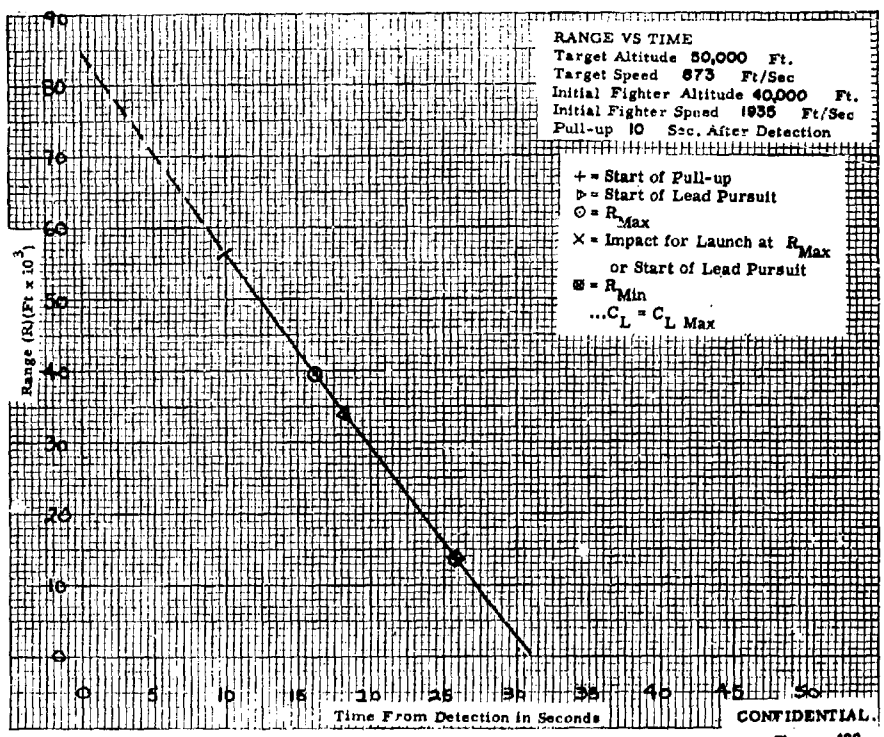

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊠ = R Min ...C L = C L Max
Range (R)(Ft x 10³)
Time From Detection in Seconds

Figure 429

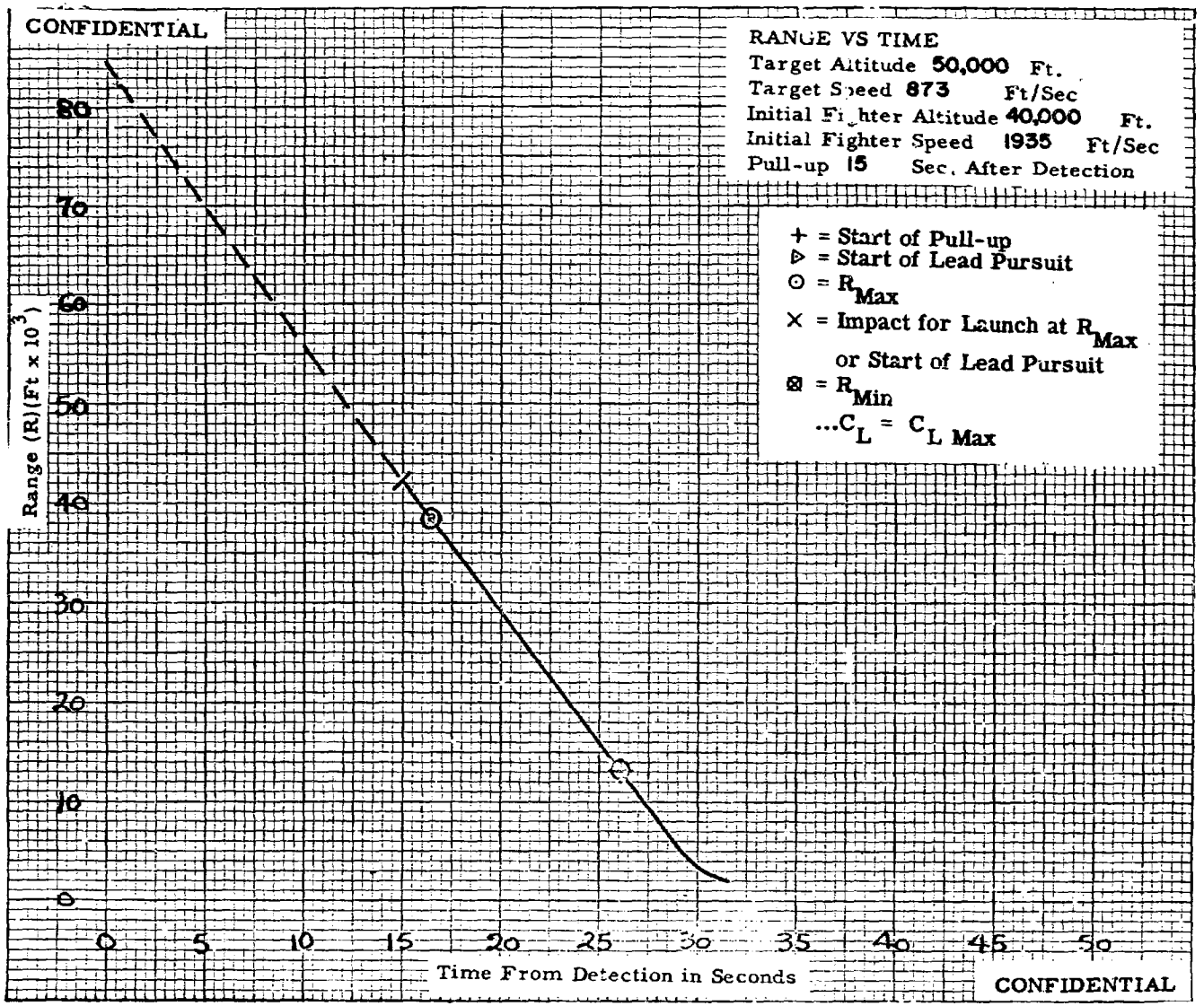
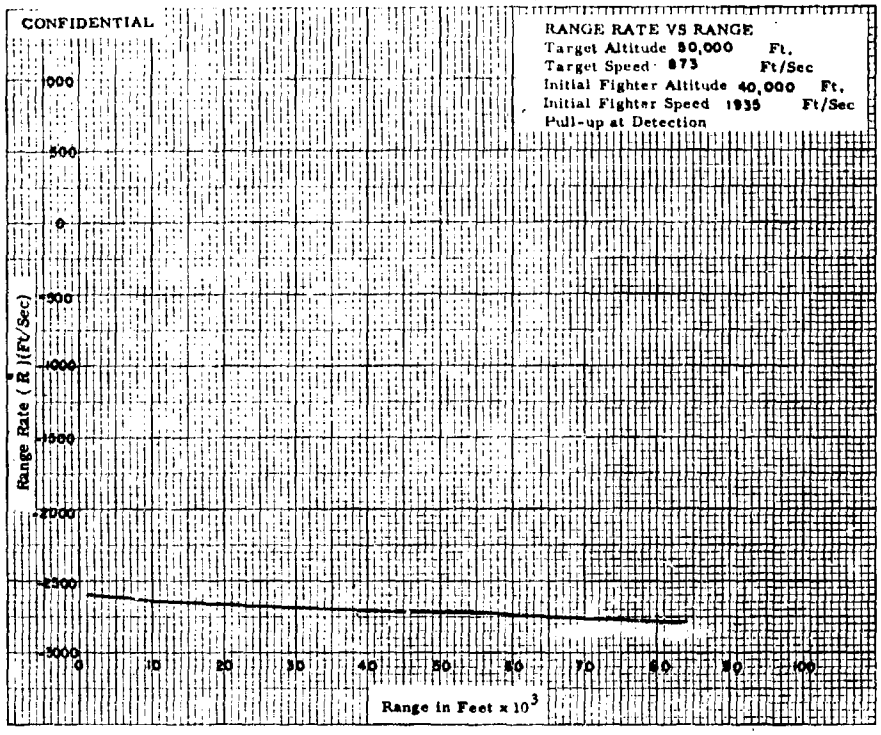

CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
CONFIDENTIAL

Figure 430


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ) (Ft/Sec)
+1000
+500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

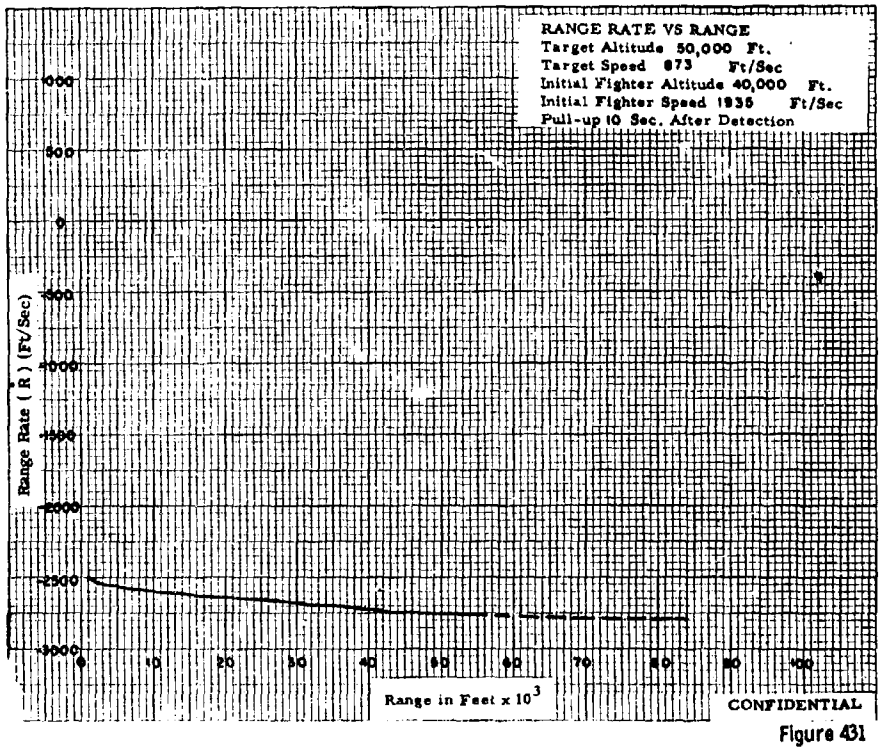

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
+1000
+500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 431

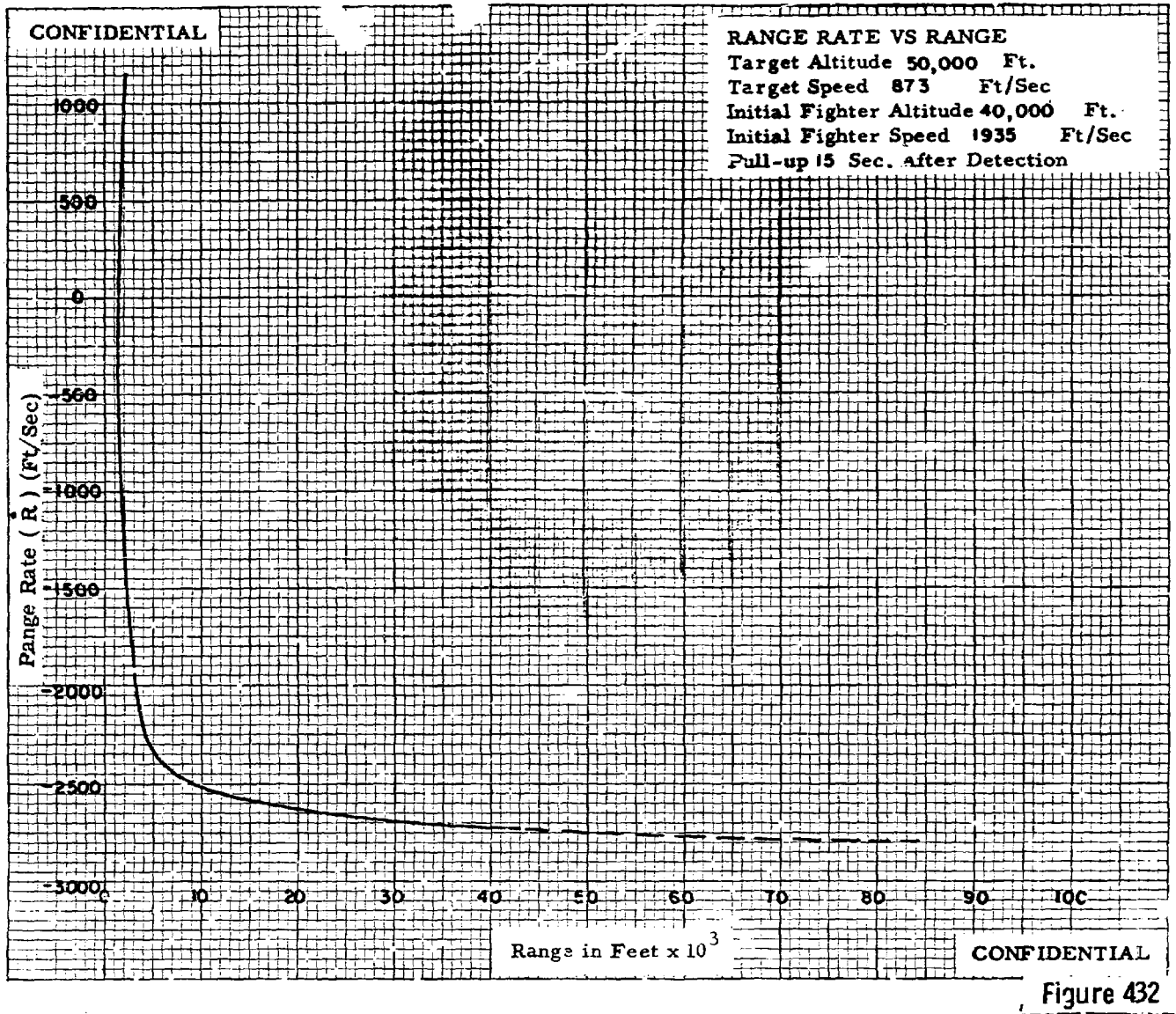
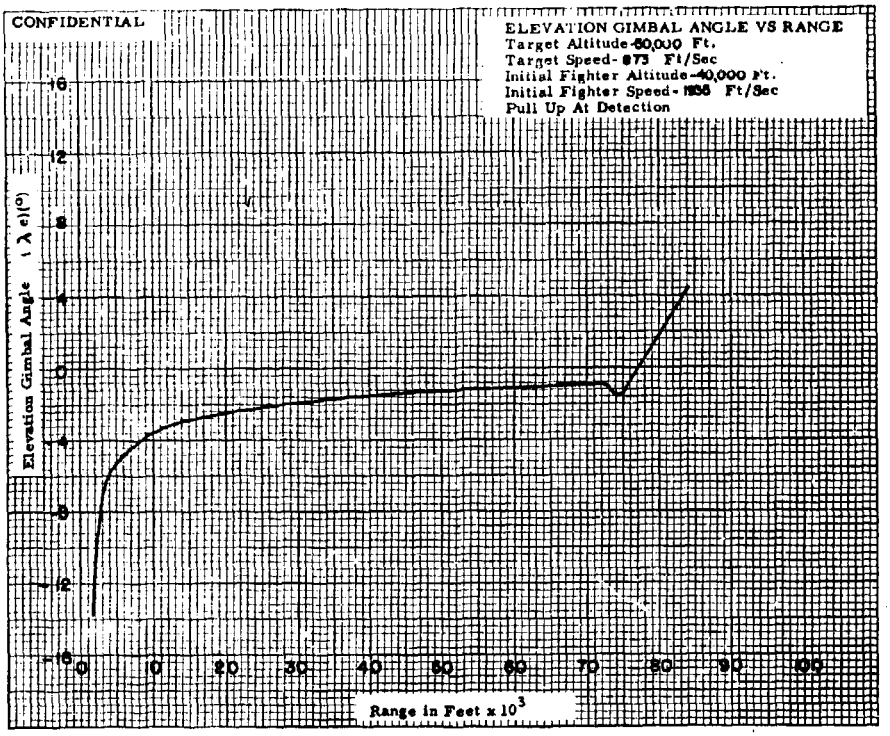

CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. after Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 432


CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-60,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1938 Ft/Sec
Pull Up At Detection
Elevation Gimbal Angle (λ e)(°)
16
12
8
4
0
-4
-8
-12
-16
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

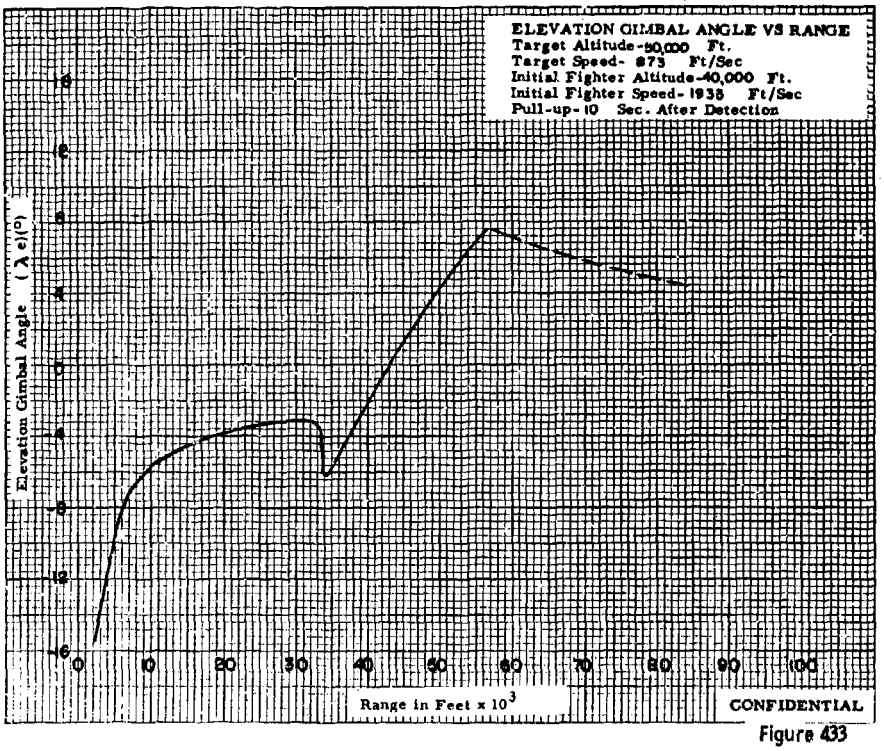

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-60,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1938 Ft/Sec
Pull-up- 10 Sec. After Detection
Elevation Gimbal Angle (λ e)(°)
16
12
8
4
0
-4
-8
-12
-16
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 433

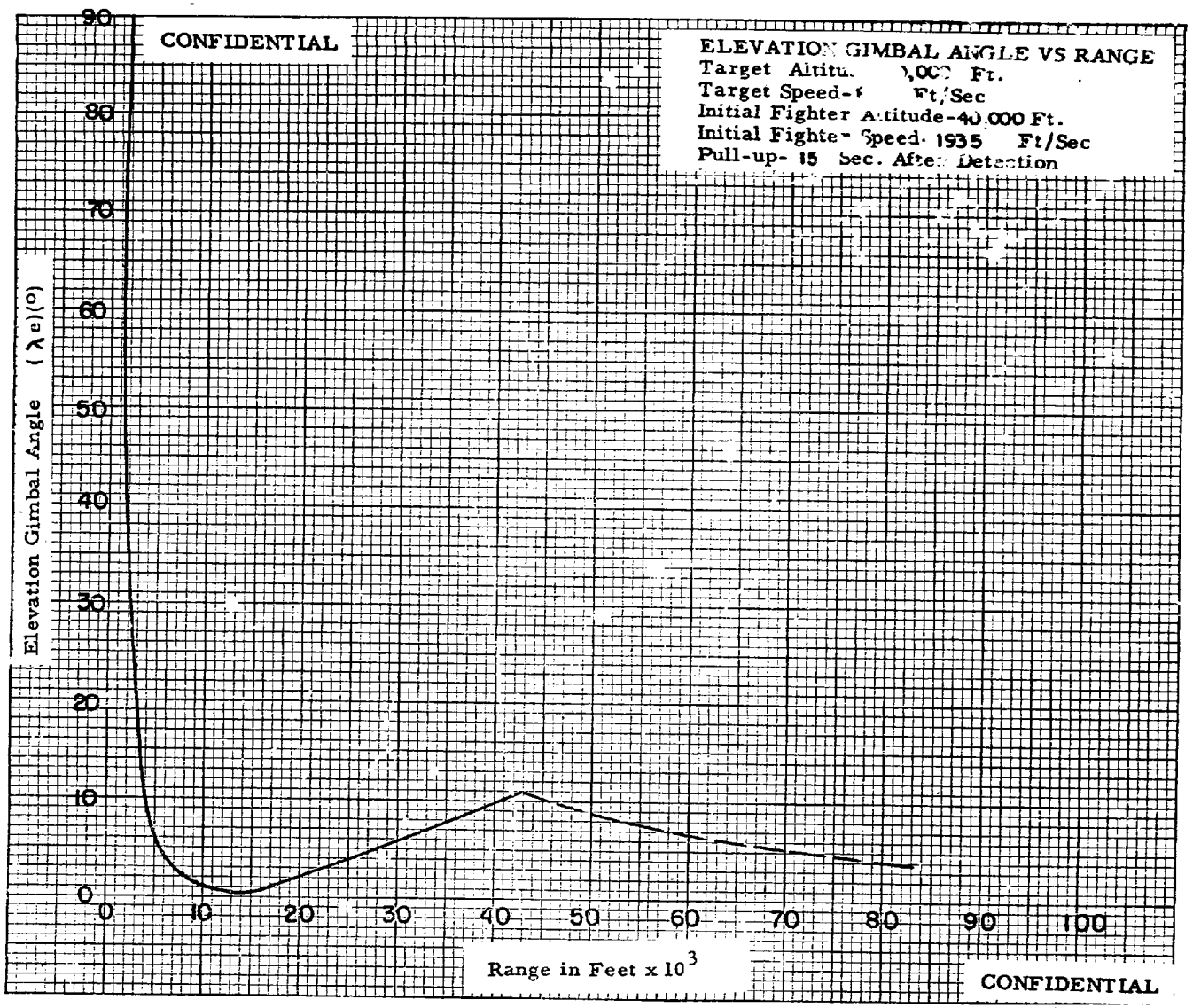
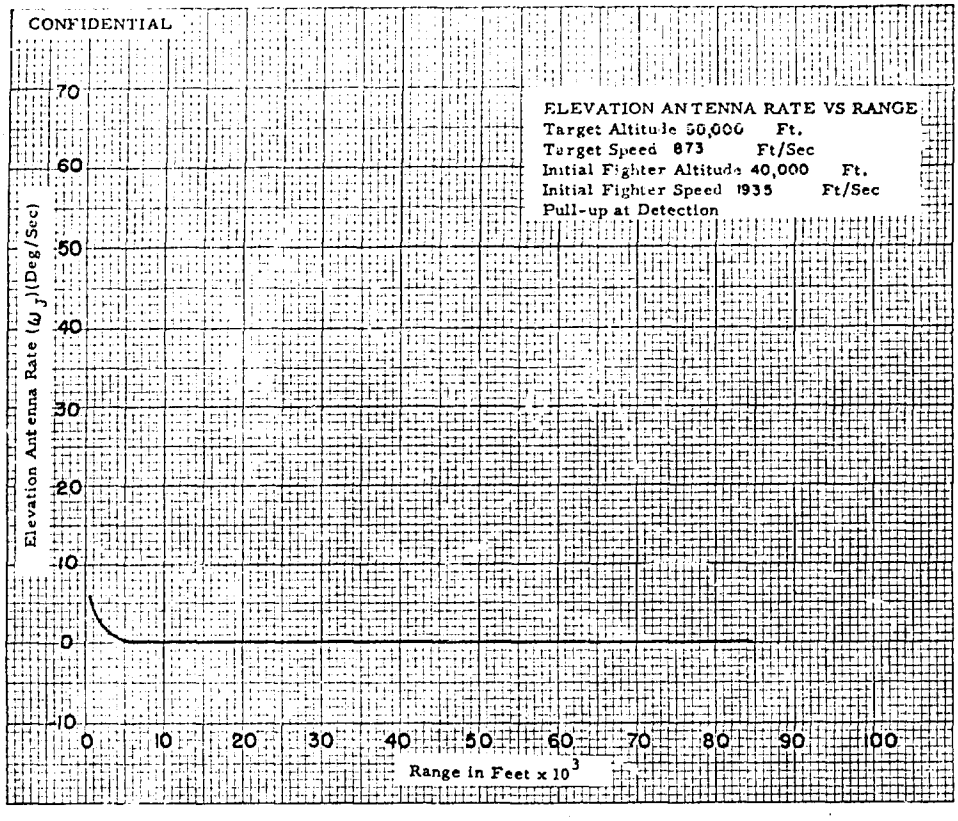

CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitu...),00? Ft.
Target Speed-... Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1935 Ft/Sec
Pull-up- 15 Sec. After Detection
Elevation Gimbal Angle (λe)(°)
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 434


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Elevation Antenna Rate (ω_y)(Deg/Sec)
70
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

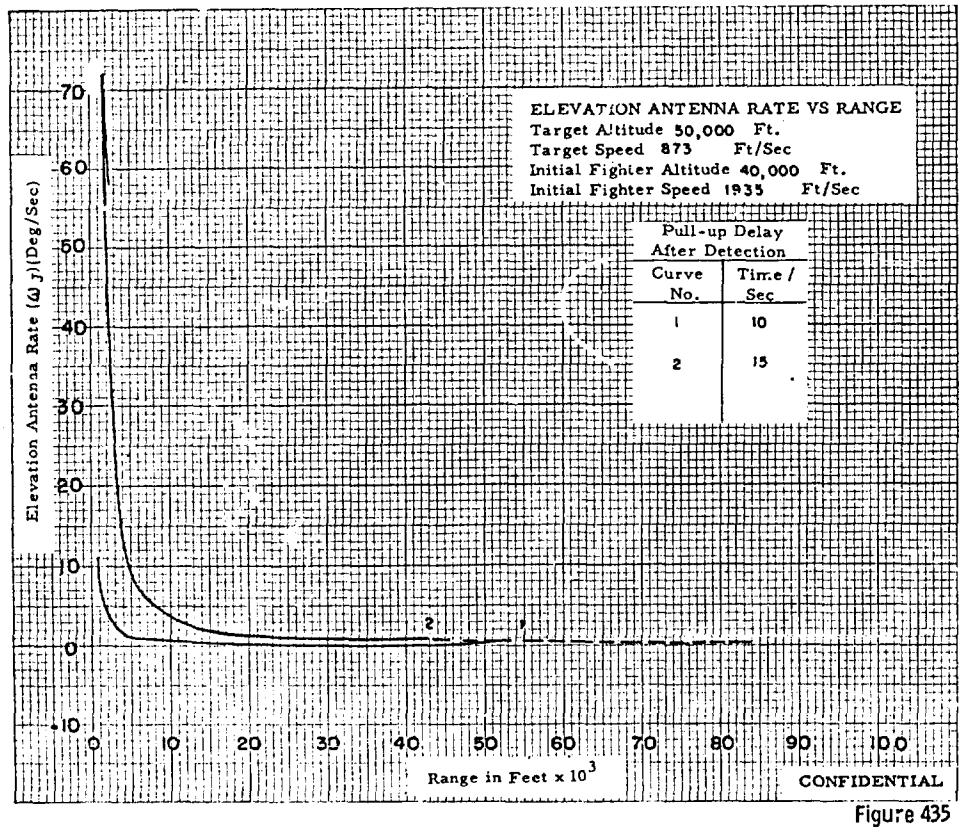
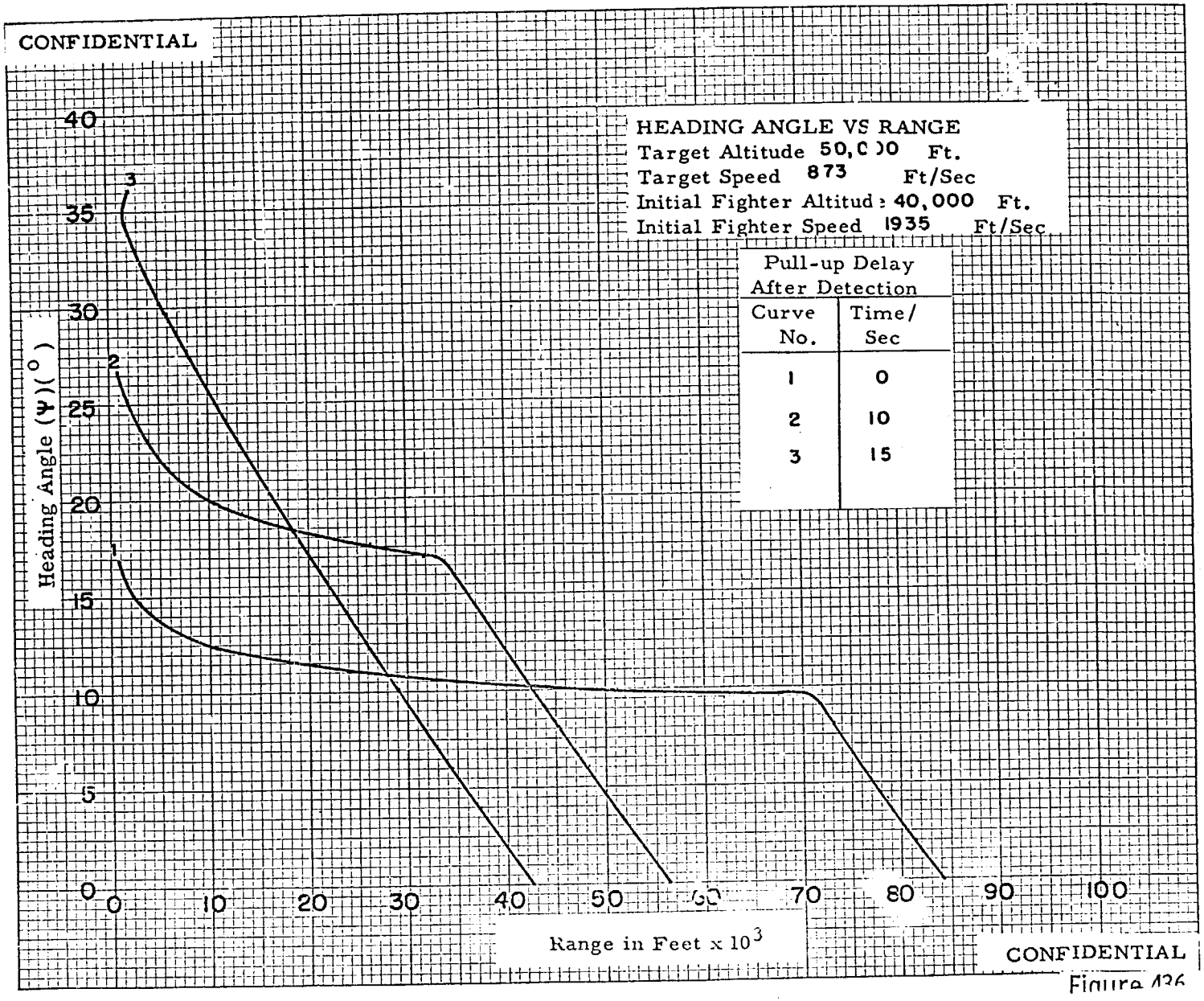

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time / Sec
1 | 10
2 | 15
Elevation Antenna Rate (ω_y)(Deg/Sec)
70
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
2
1

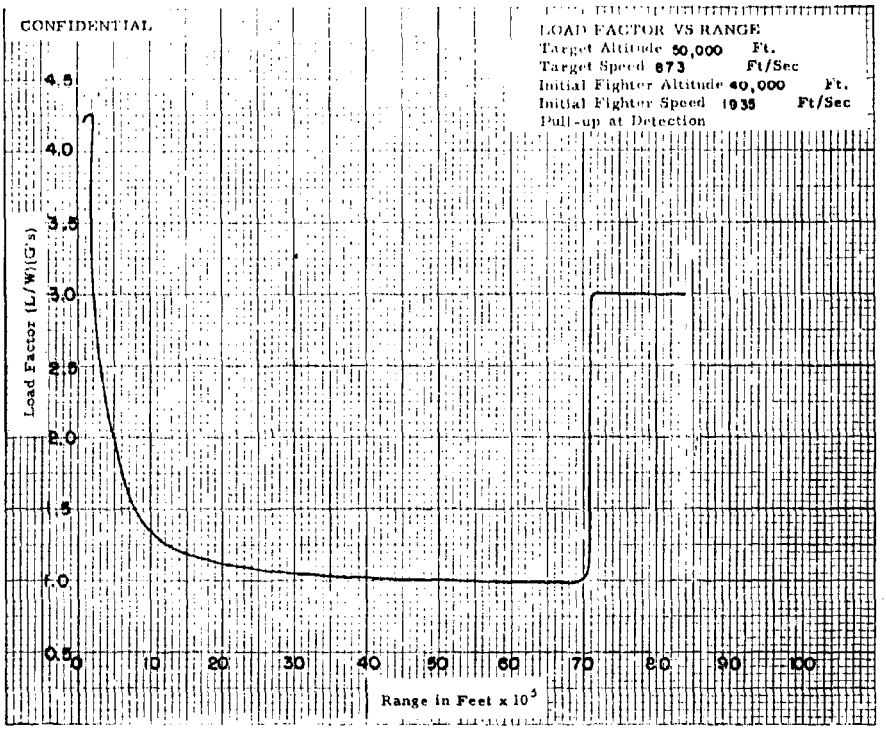
Figure 435

CONFIDENTIAL



CONFIDENTIAL

Figure 436


LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

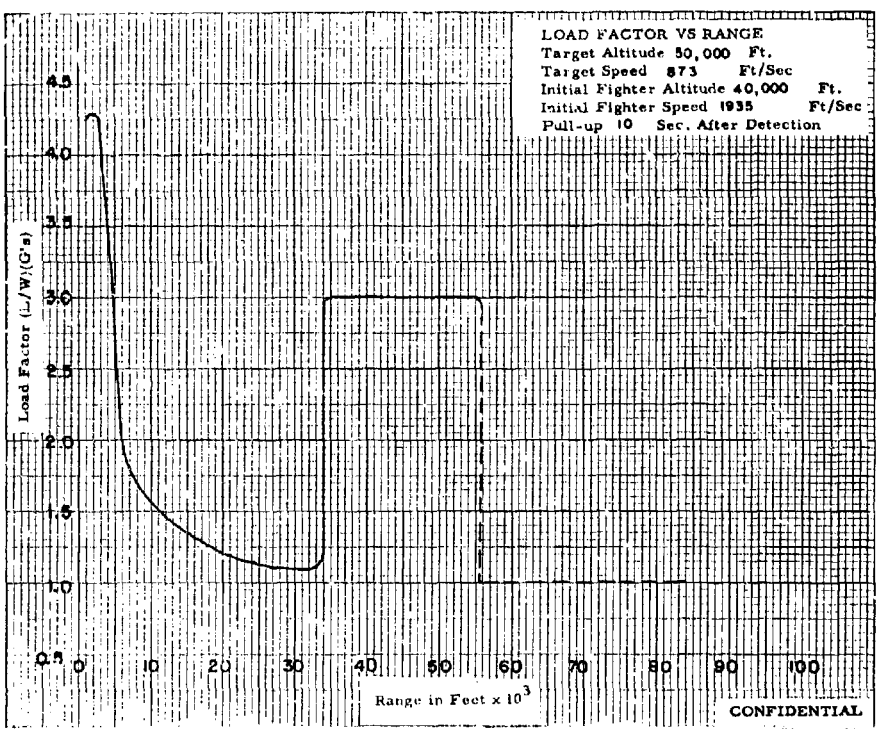

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 437

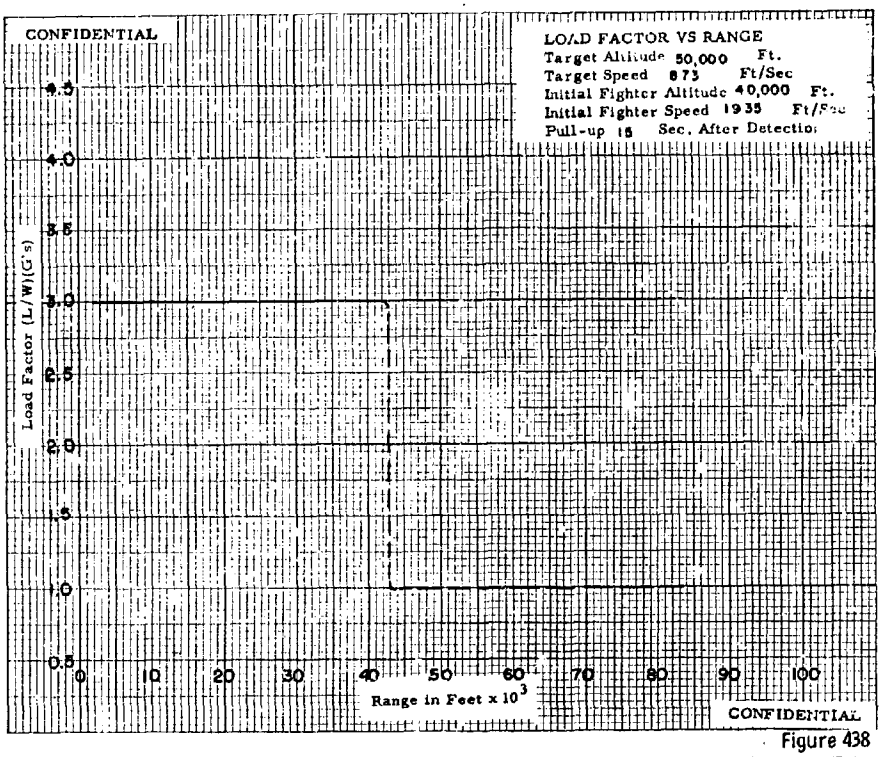


Figure 438

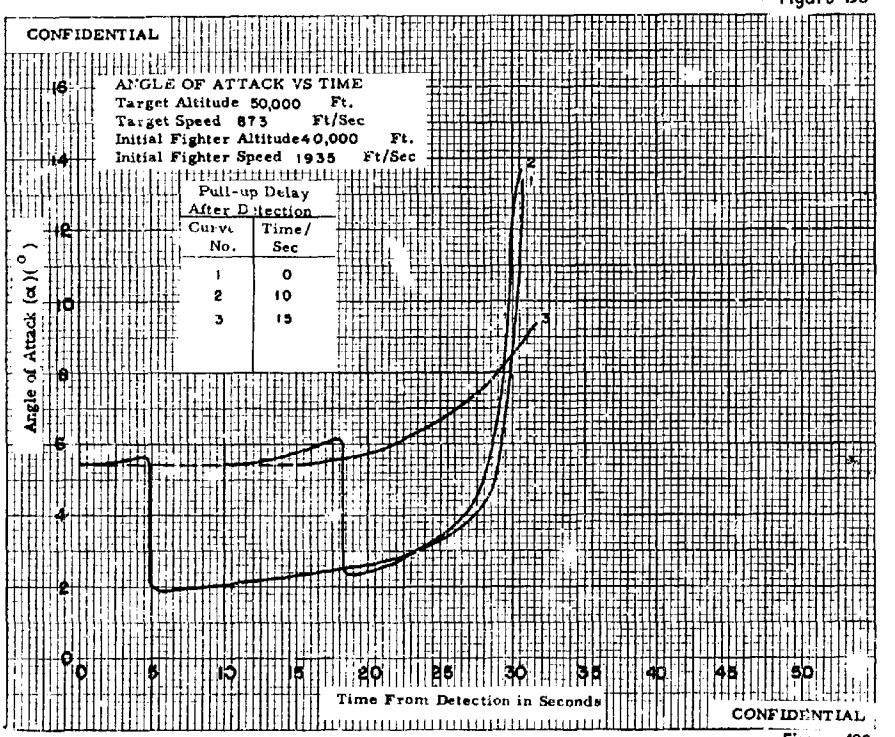


Figure 439

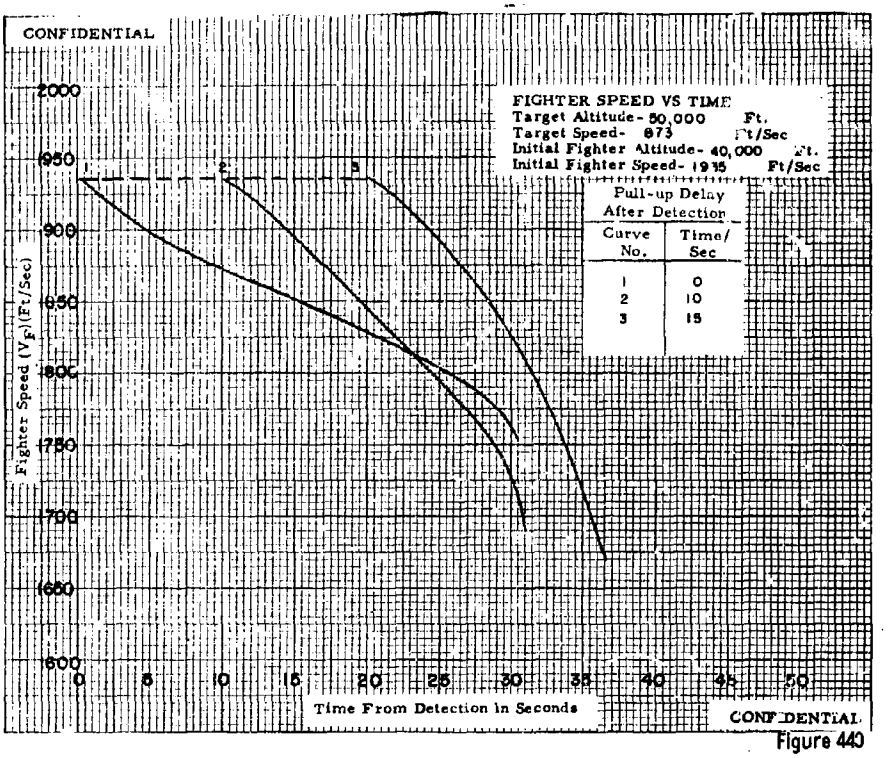


Figure 440

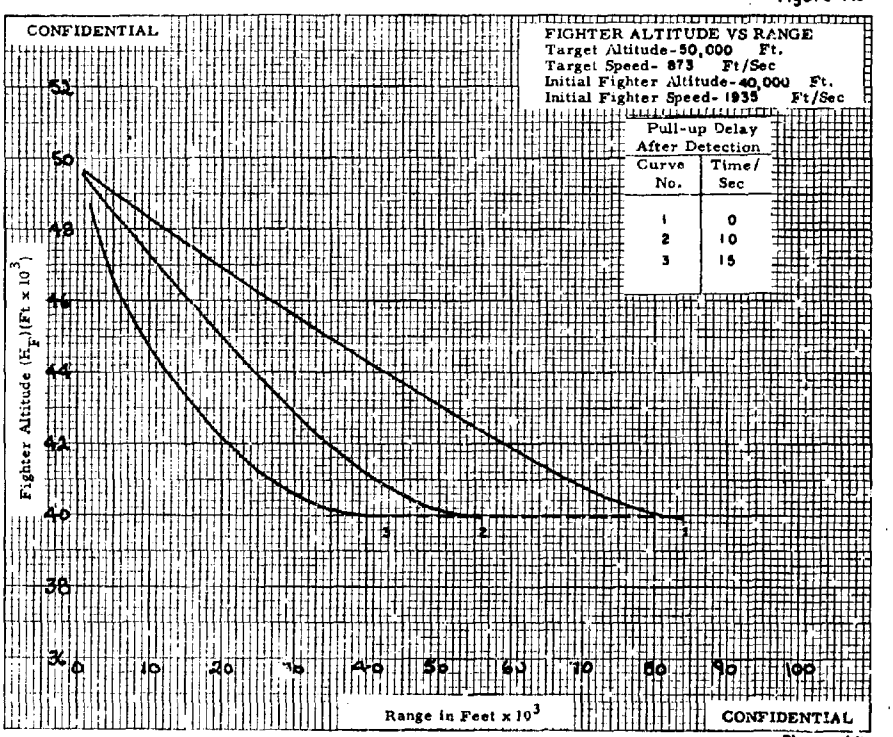
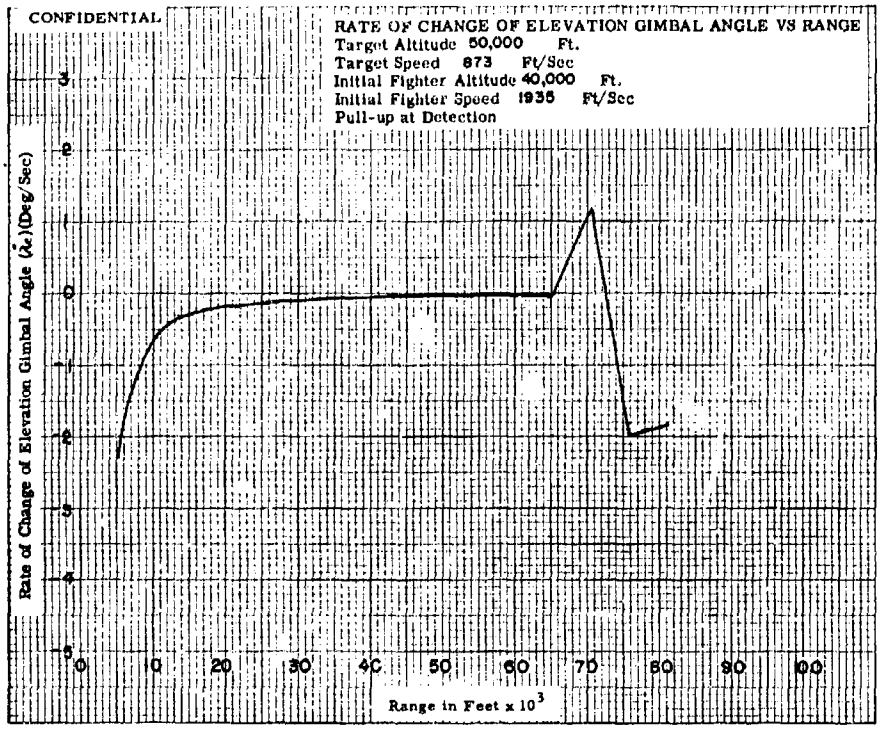


Figure 441


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle (Ae)(Deg/Sec)
Range in Feet x 10^3

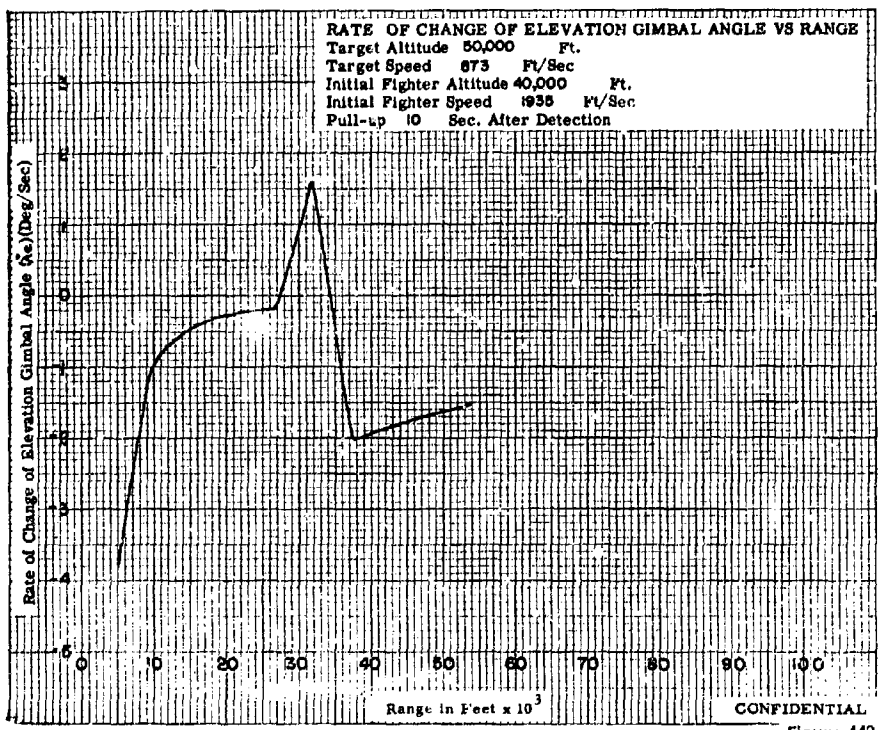

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (Ae)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 442

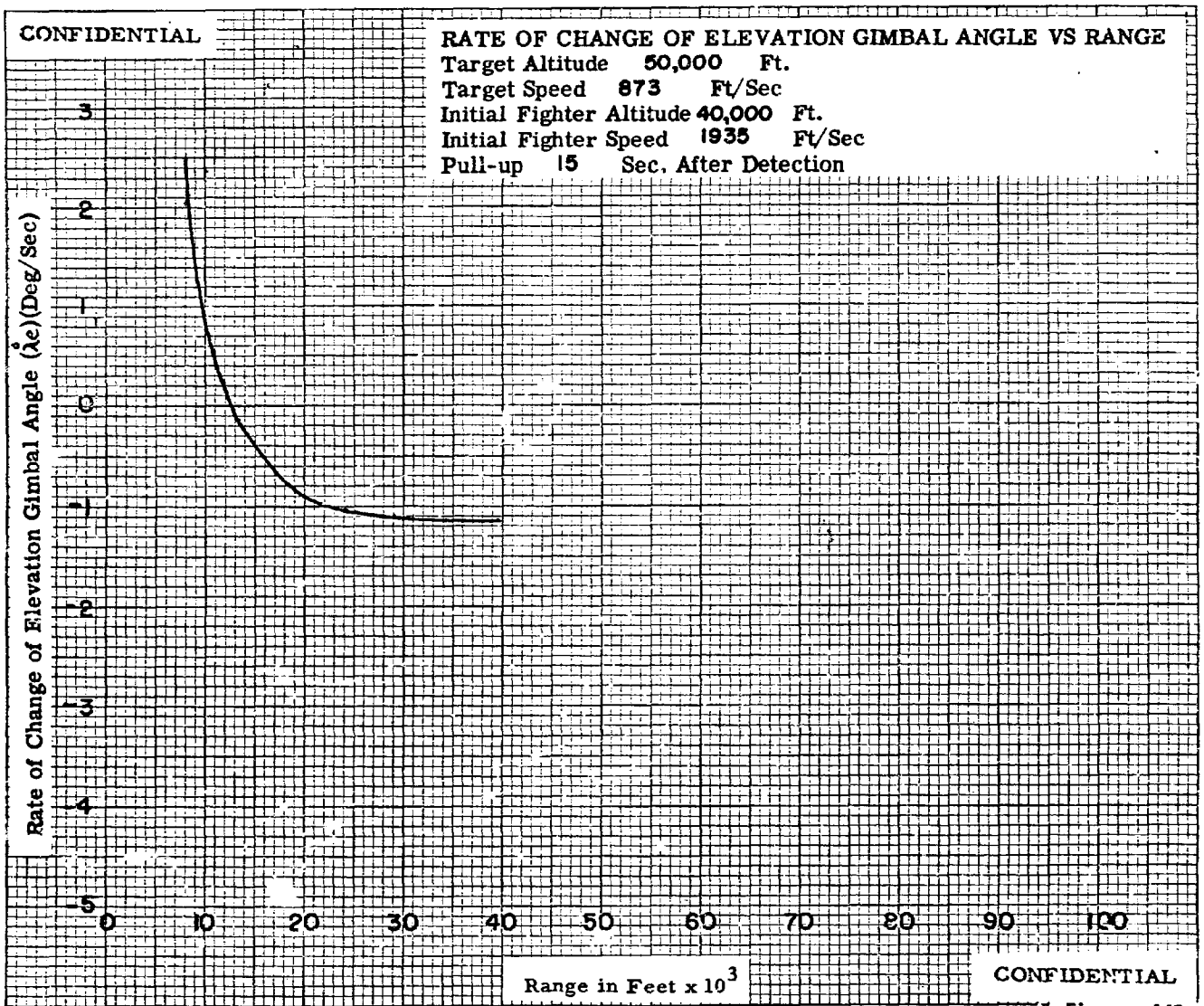
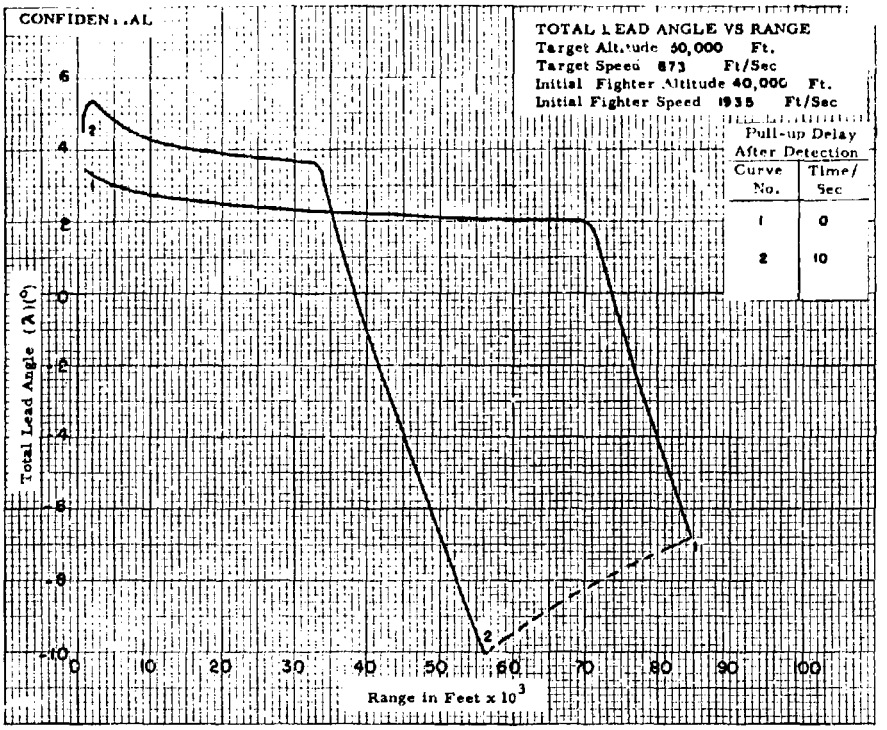

CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
3
2
1
0
-1
-2
-3
-4
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 443


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
Total Lead Angle (λ)(°)
Range in Feet x 10^3

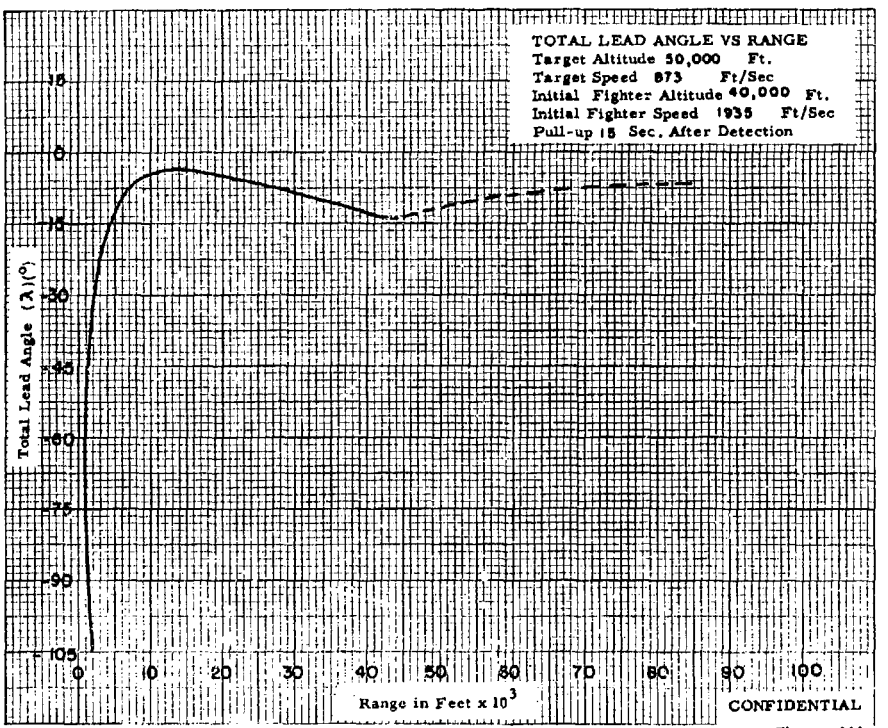
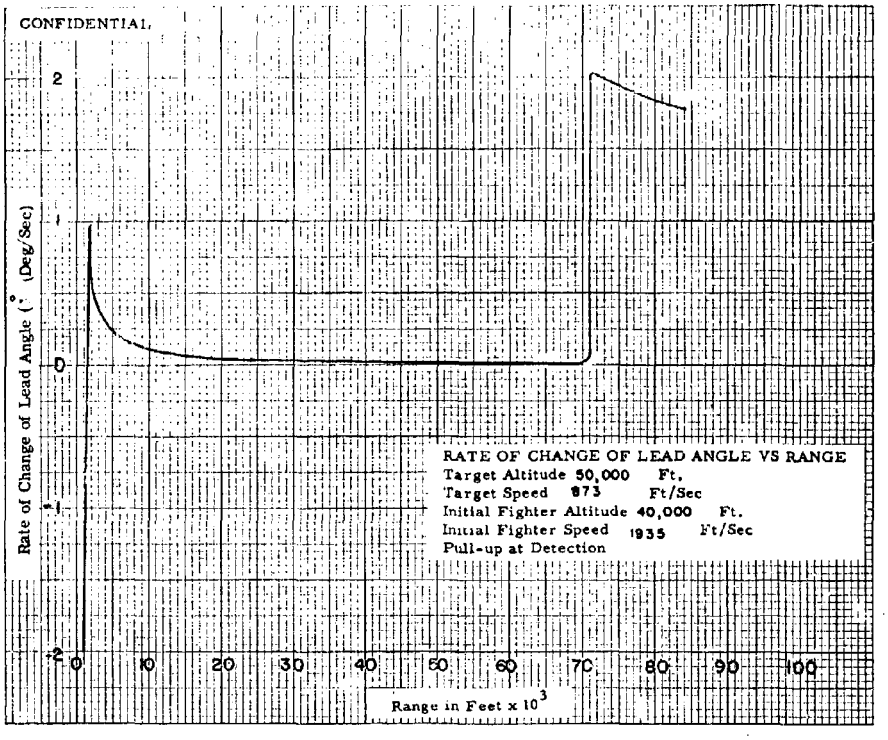

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 15 Sec. After Detection
Total Lead Angle (λ)(°)
Range in Feet x 10^3
CONFIDENTIAL

Figure 444


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (°) (Deg/Sec)
2
1
0
-1
-2
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

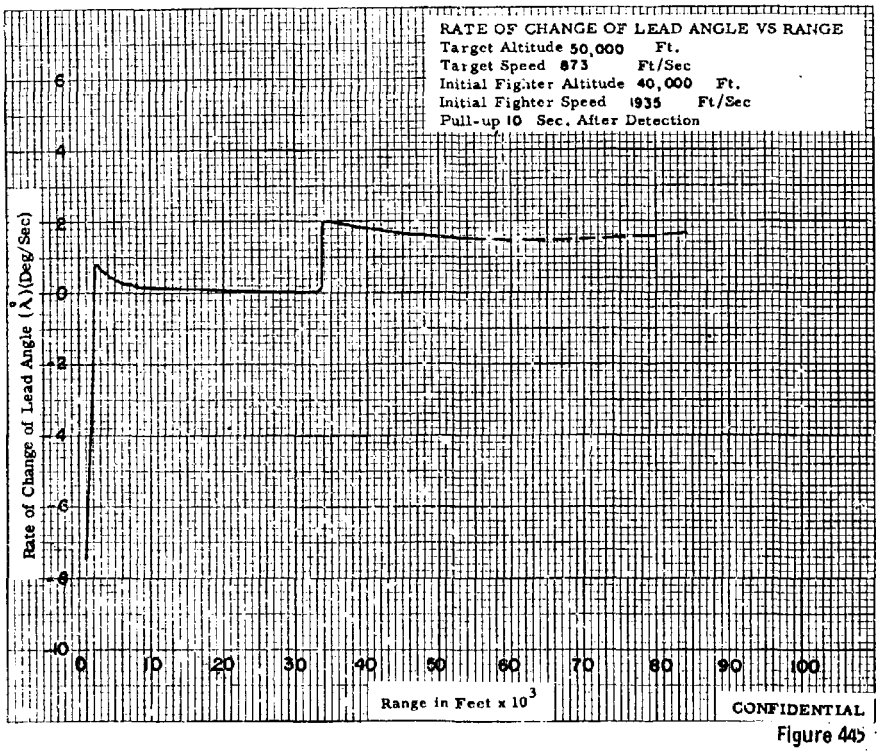

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1935 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle (°)(Deg/Sec)
6
4
2
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 445

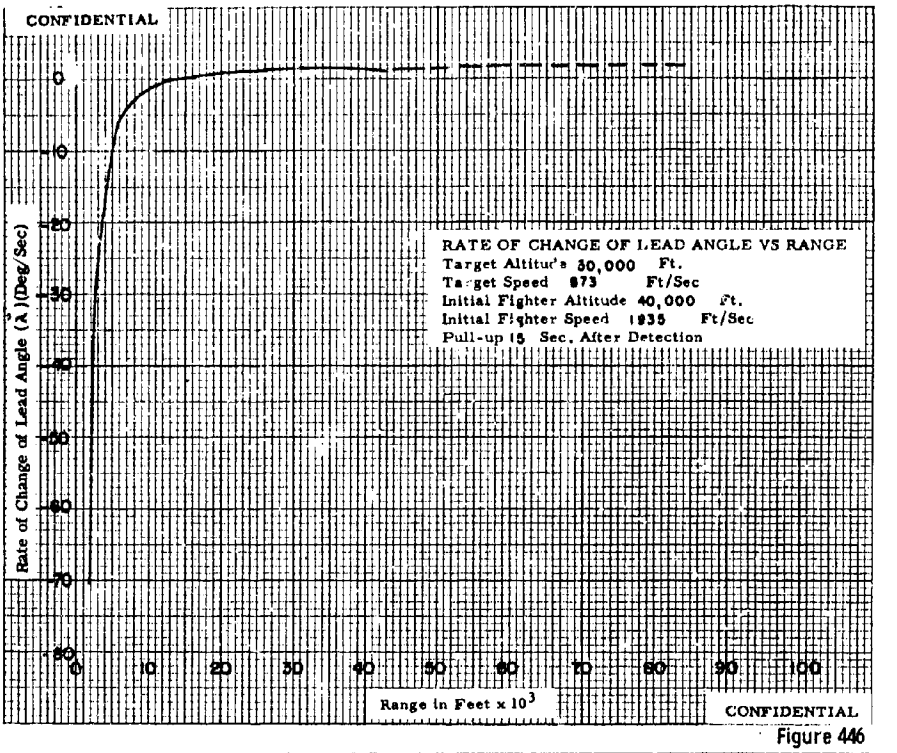


Figure 446

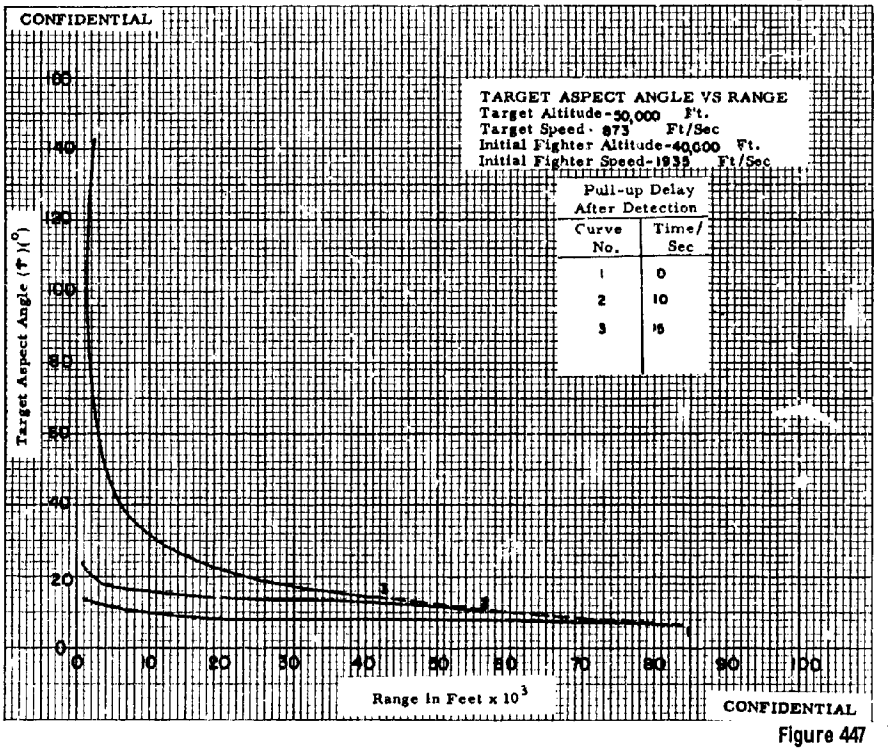
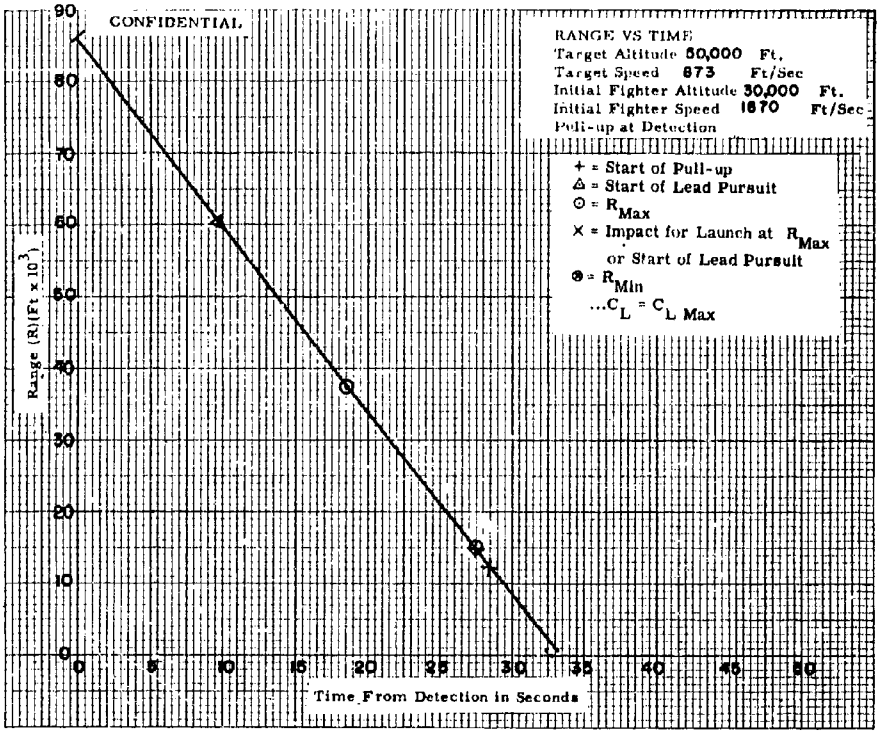


Figure 447


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1670 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
Δ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min ...C L = C L Max
Range (R)(Ft x 10^3)
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds

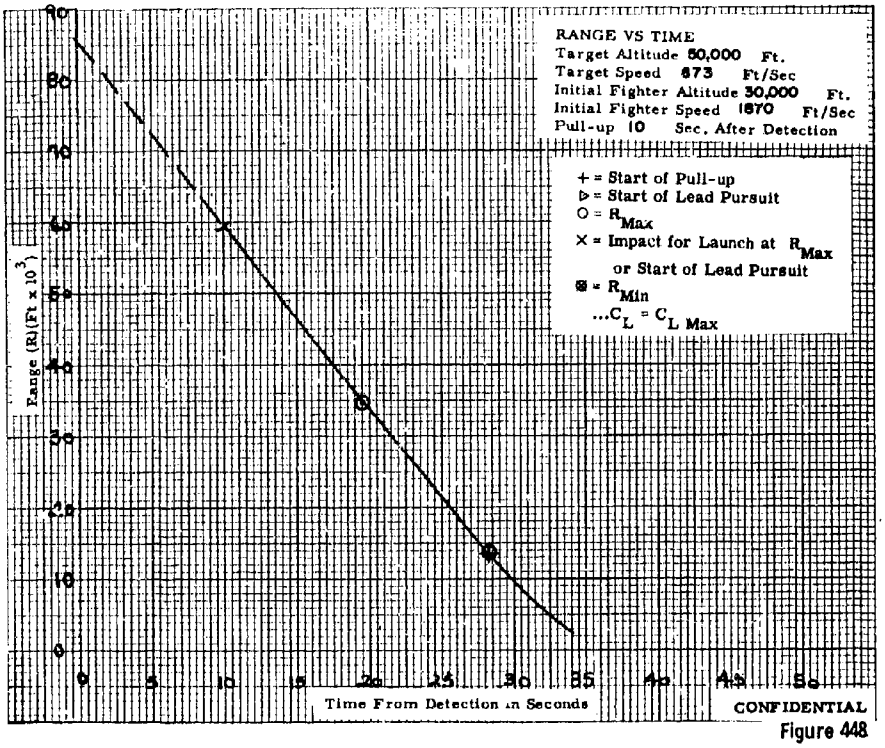

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1670 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min ...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 448

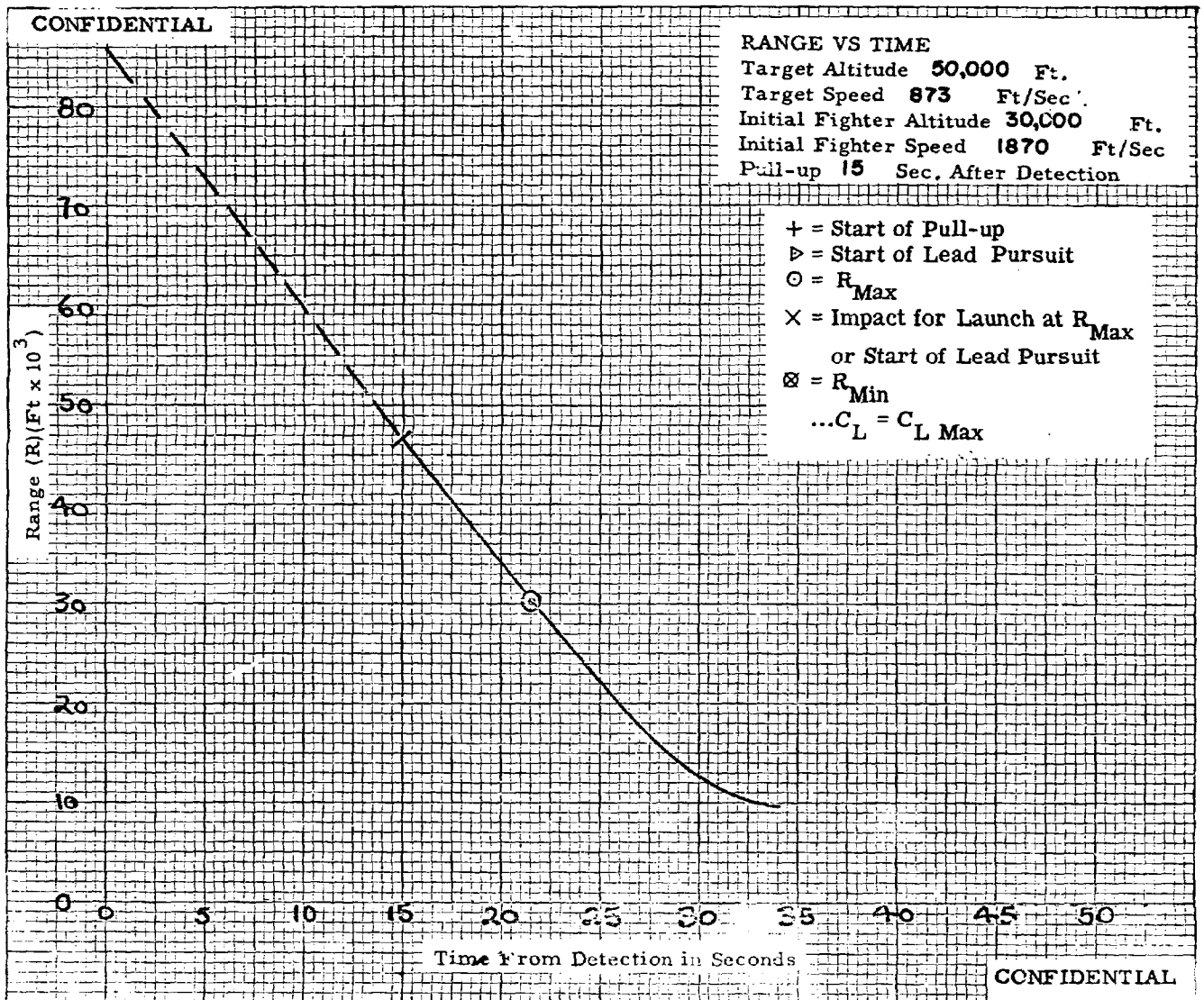
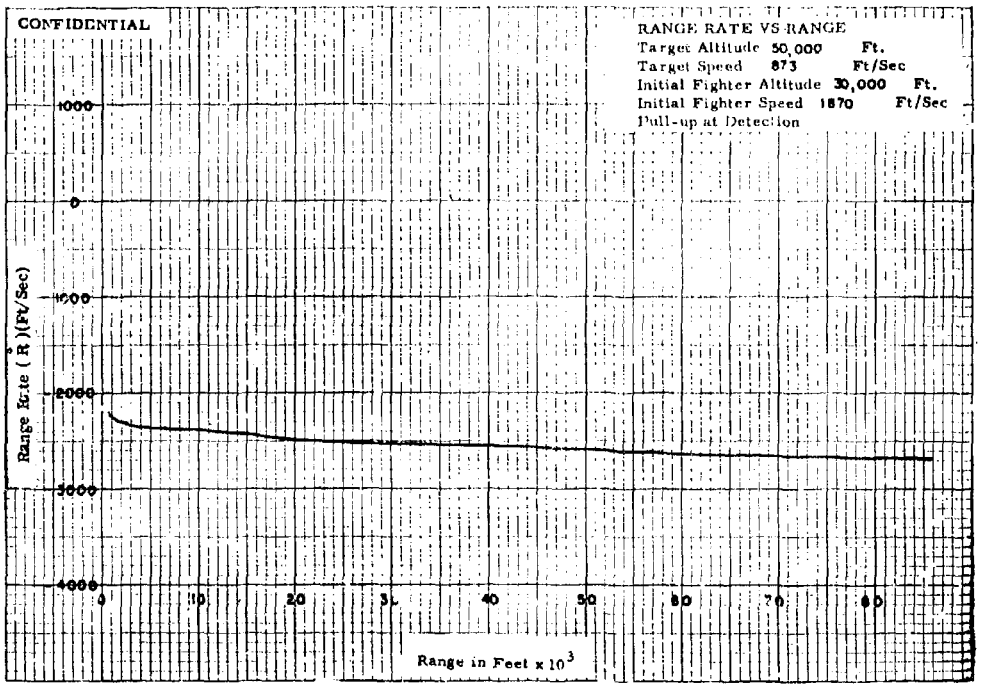

CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1870 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
80
70
60
50
40
30
20
10
0
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds
CONFIDENTIAL

Figure 449


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1870 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

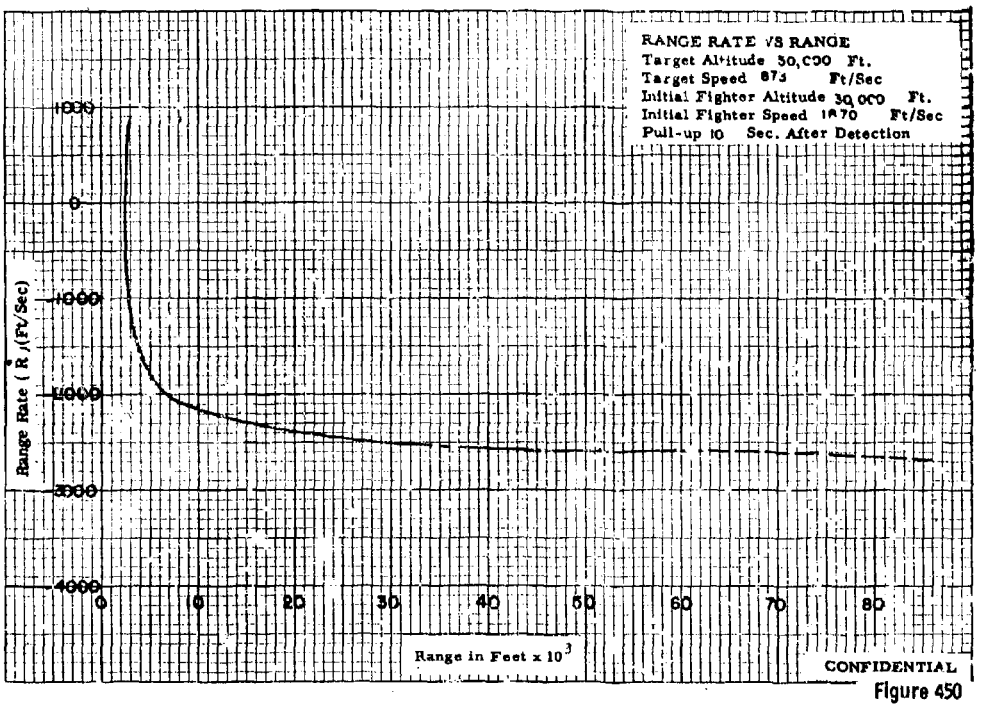

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1870 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 450

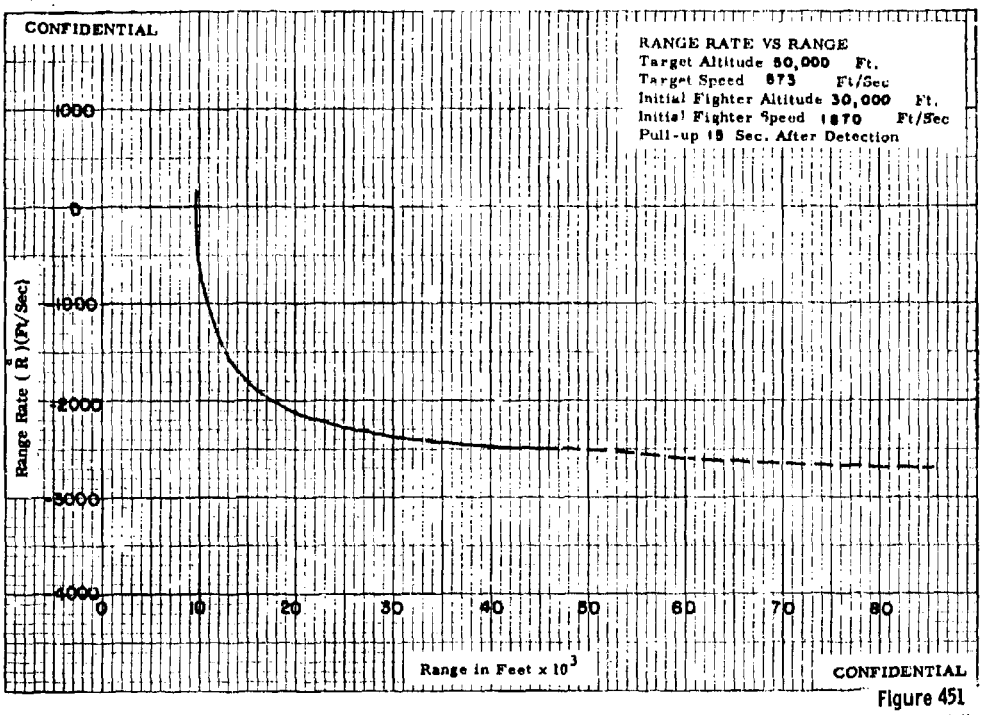


Figure 451

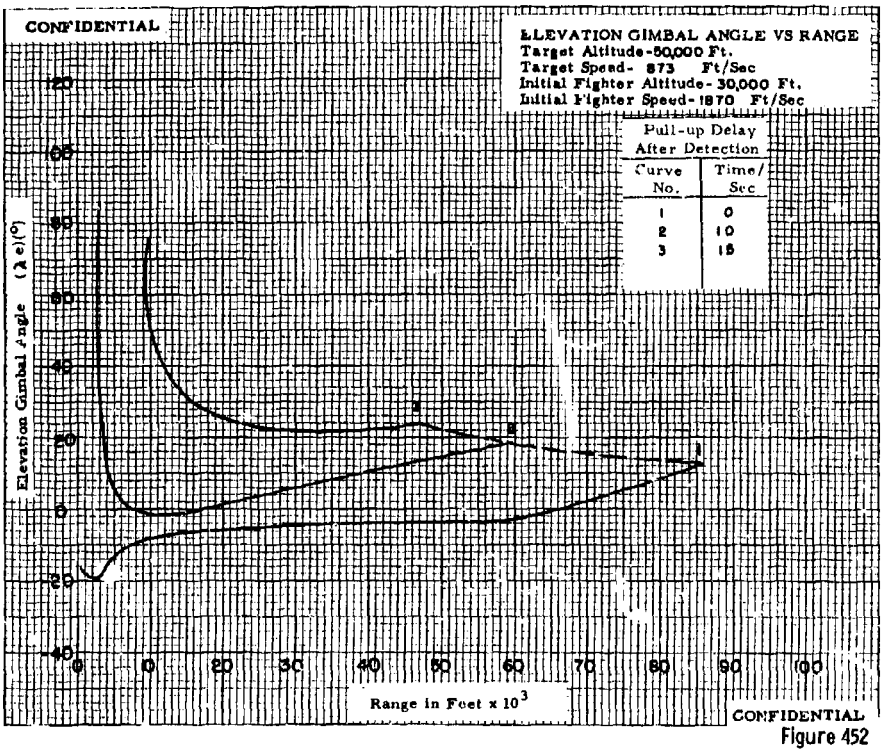


Figure 452

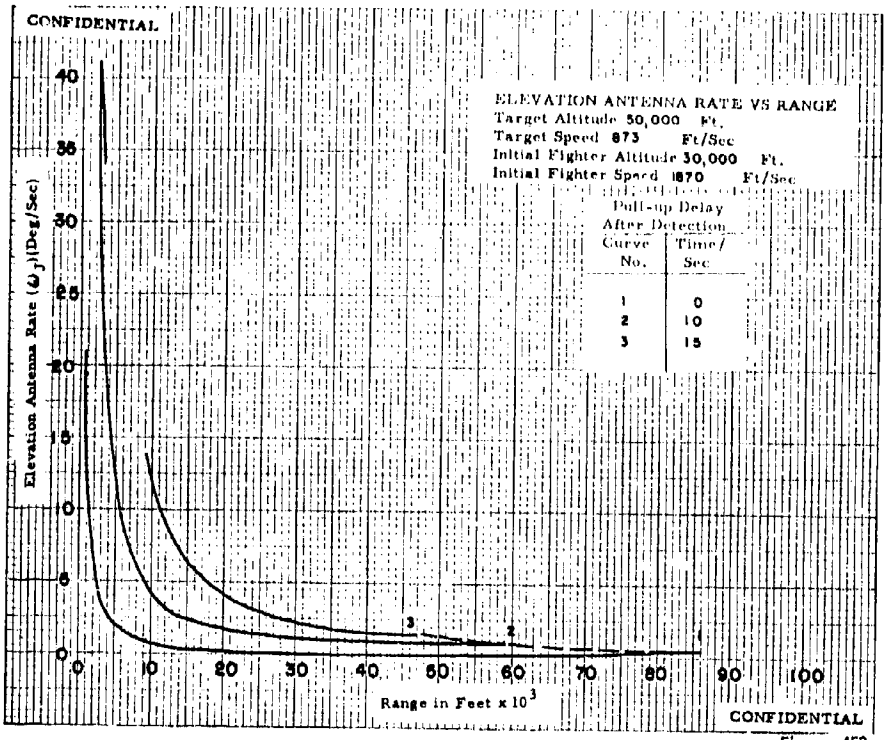


Figure 453

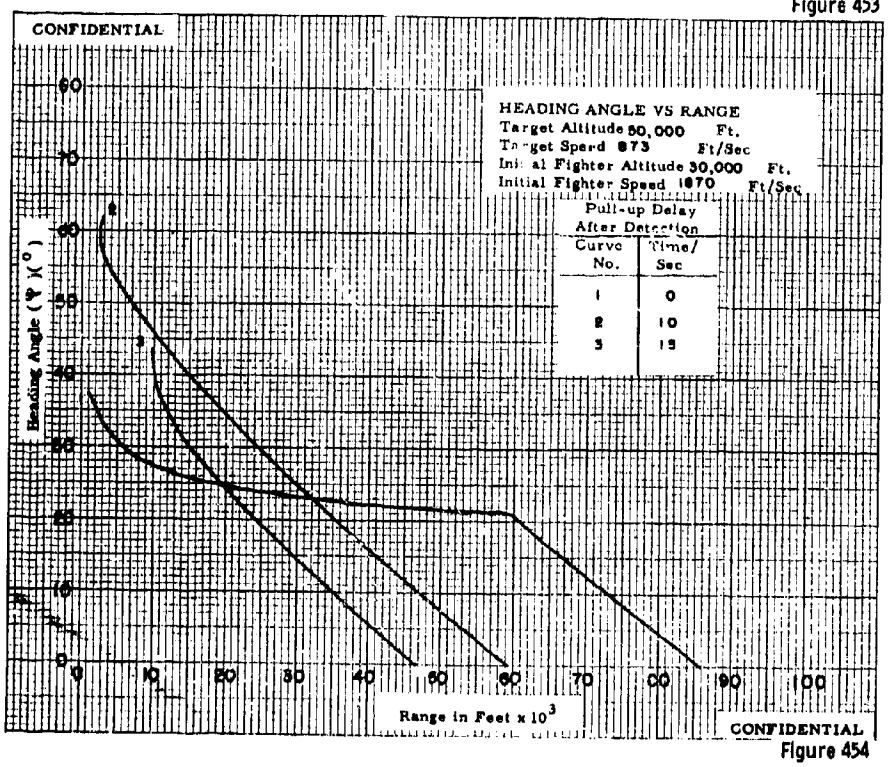
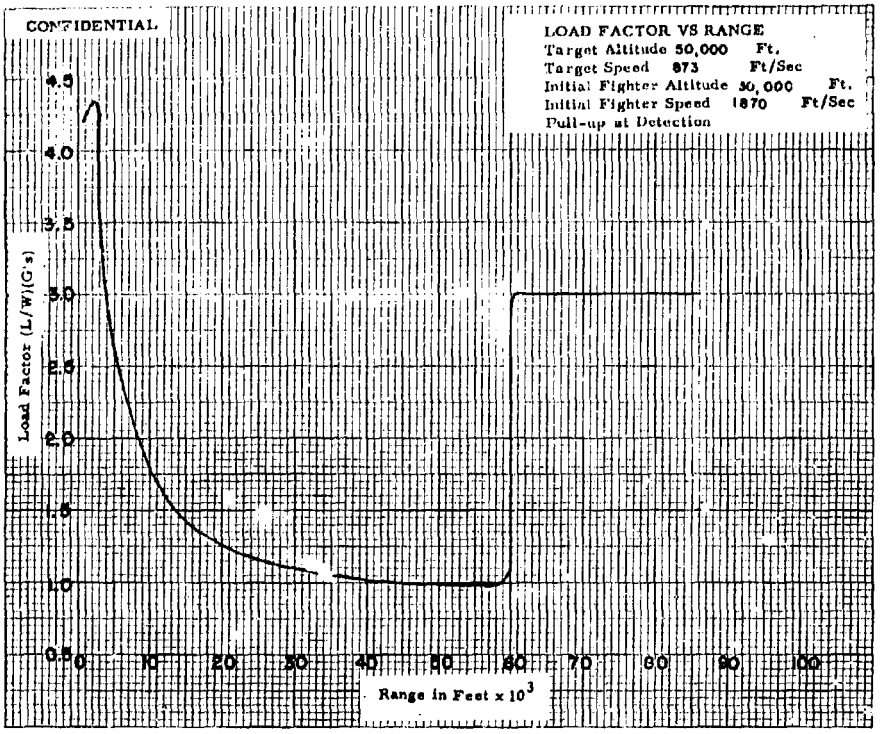


Figure 454


LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1870 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

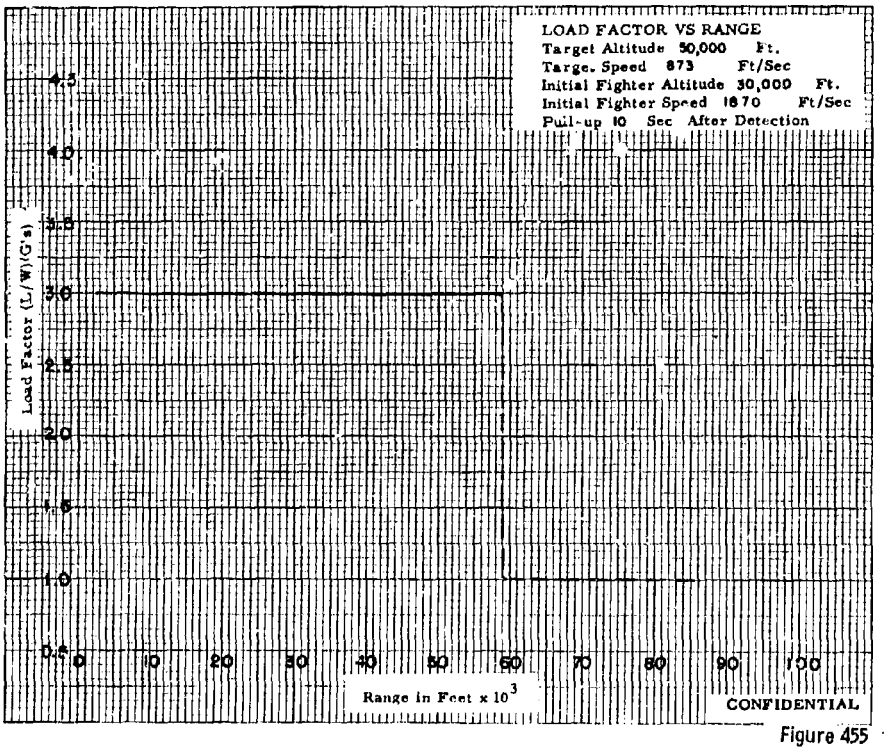

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Targe. Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1870 Ft/Sec
Pull-up 10 Sec After Detection
Load Factor (L/W)(G's)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 455

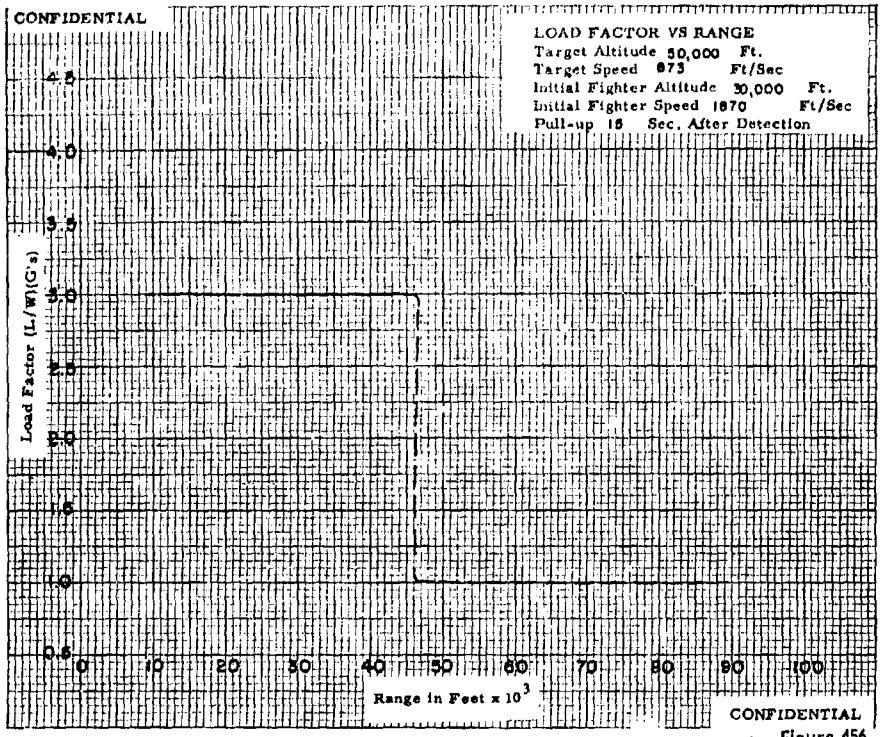


Figure 456

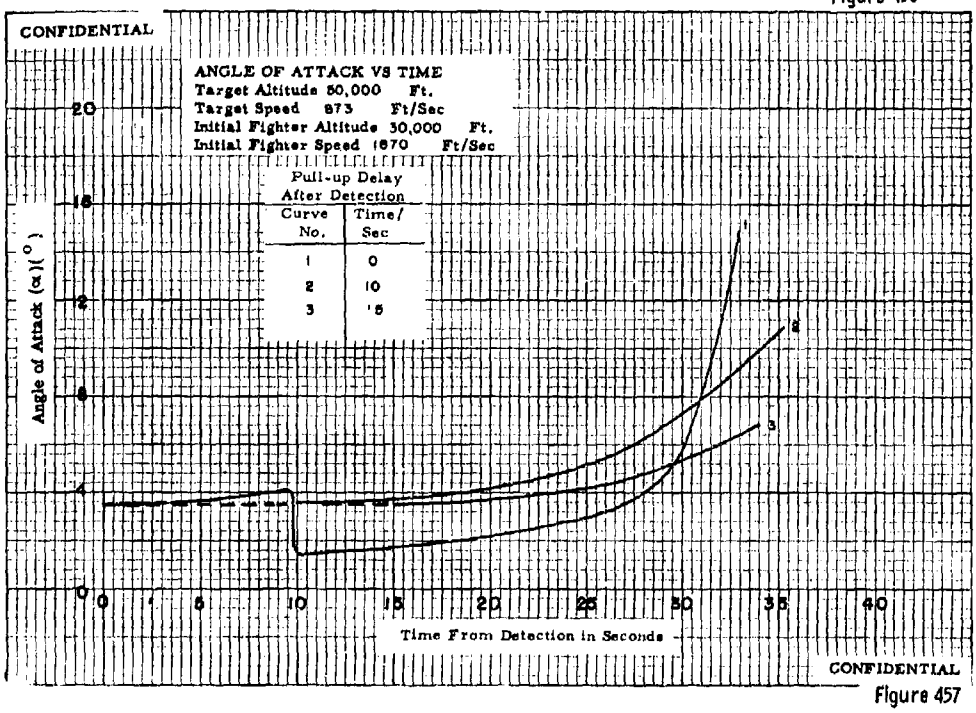


Figure 457

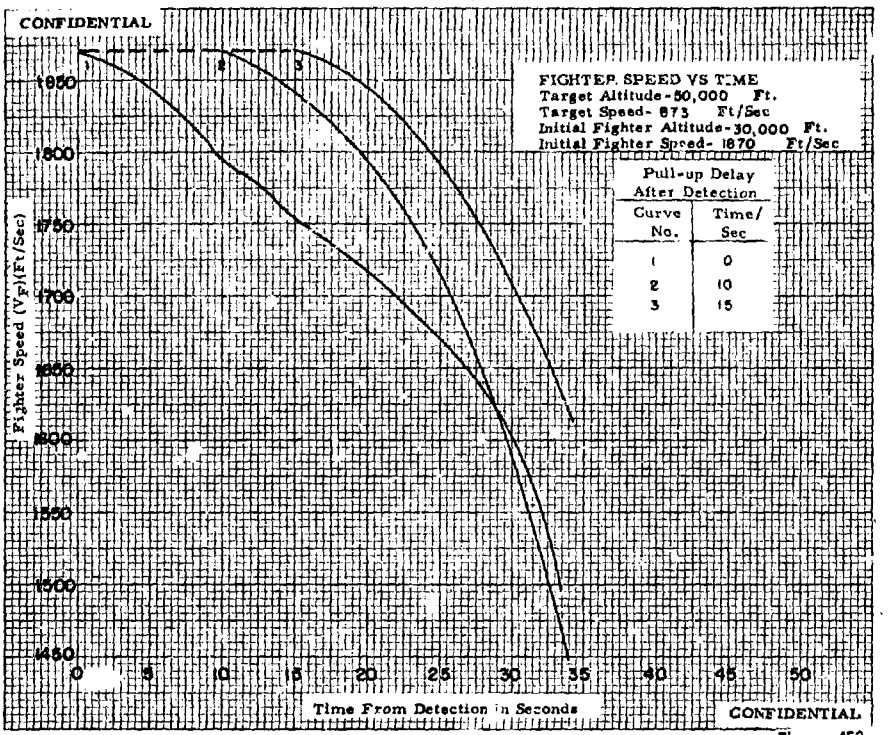


Figure 458

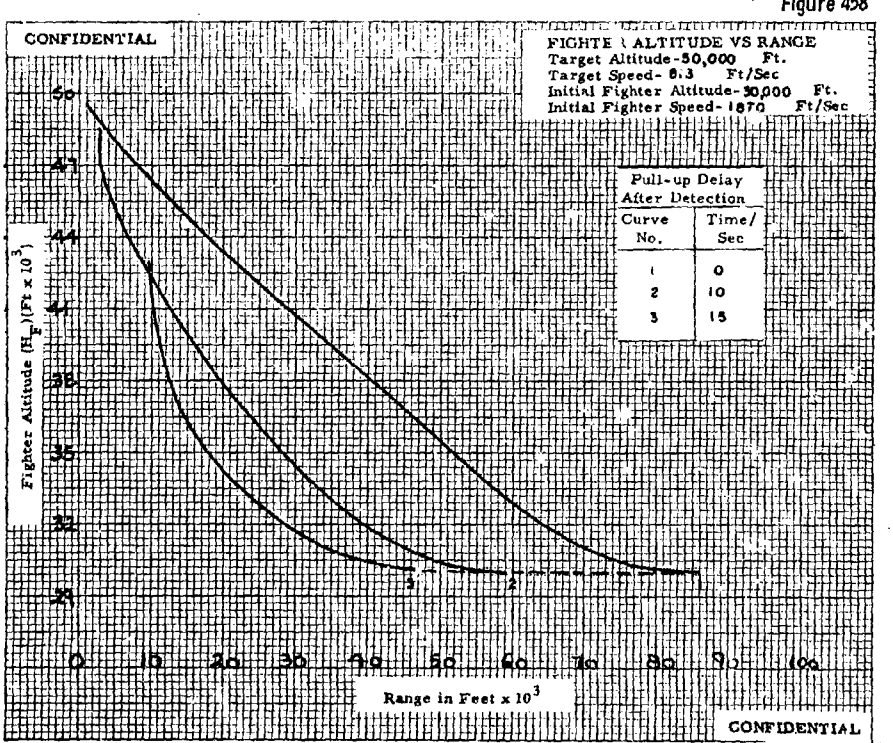
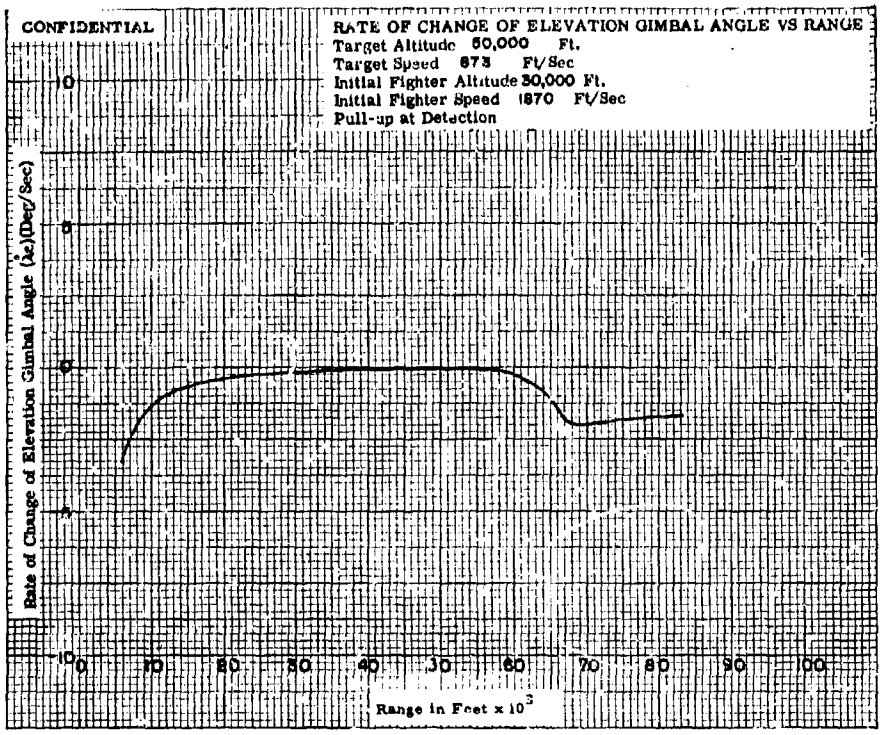


Figure 459


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1870 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle (Ae)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

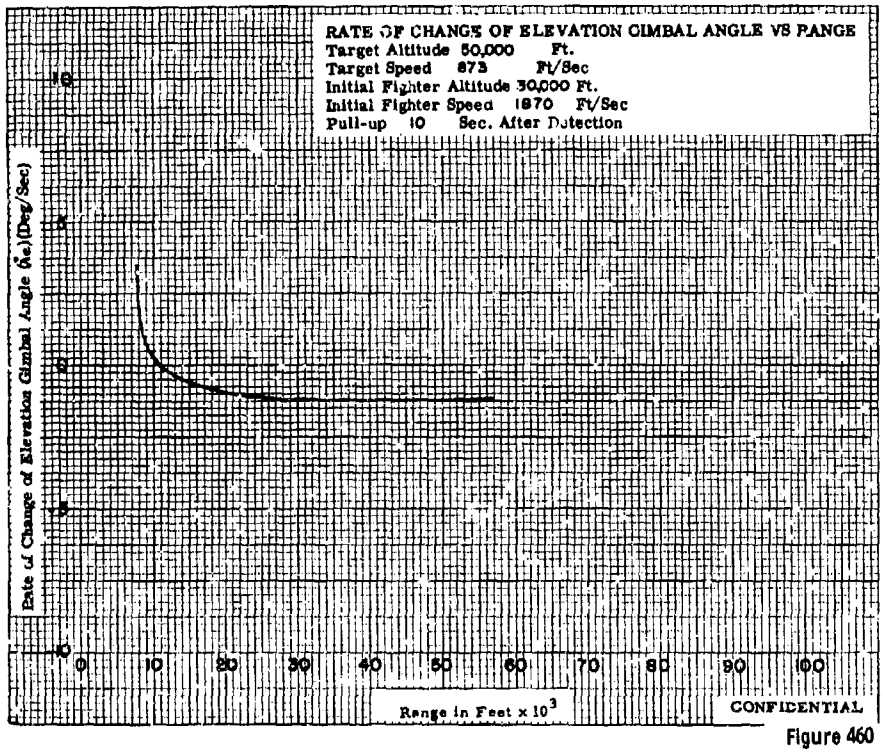

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1870 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (Ae)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 460

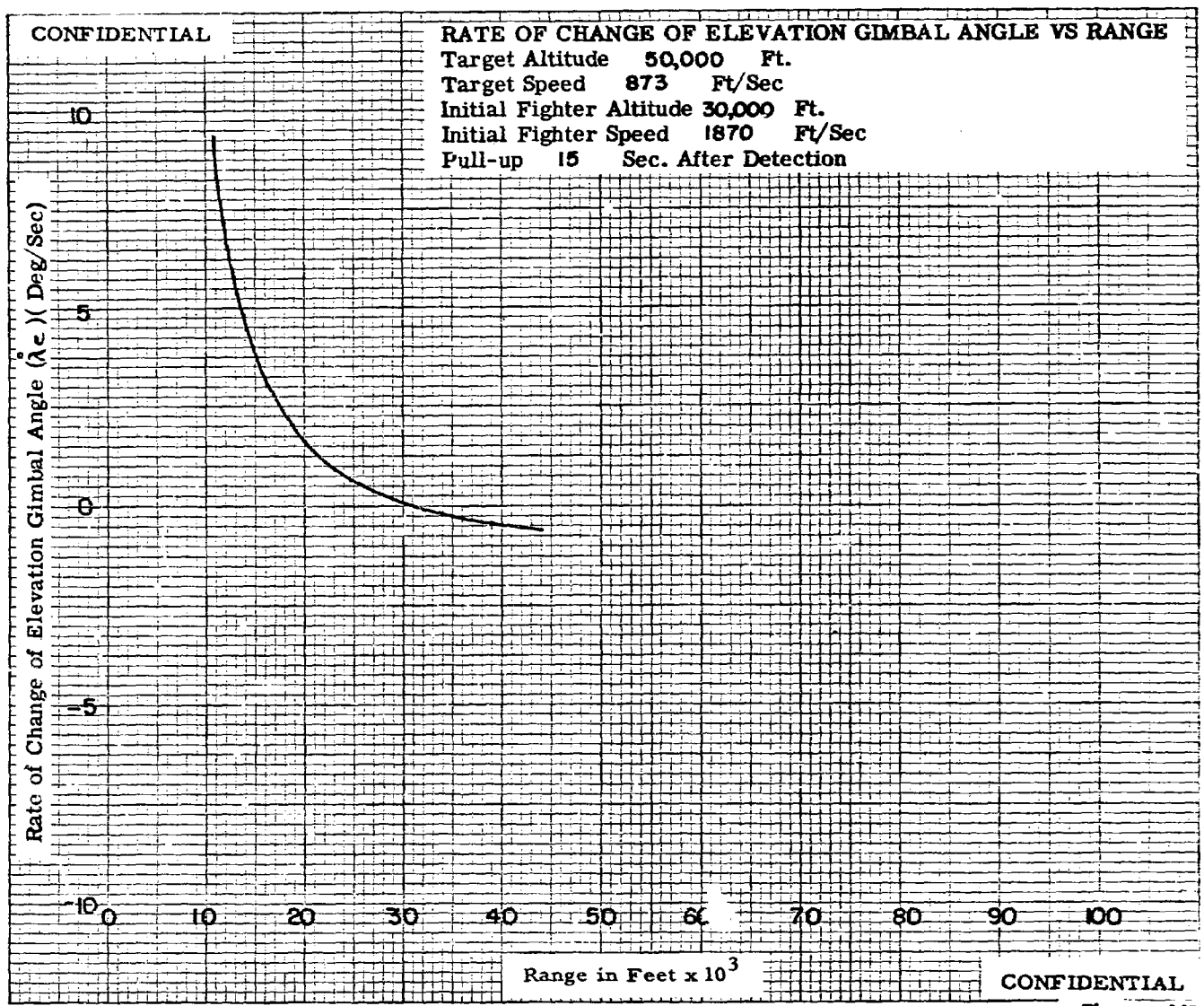
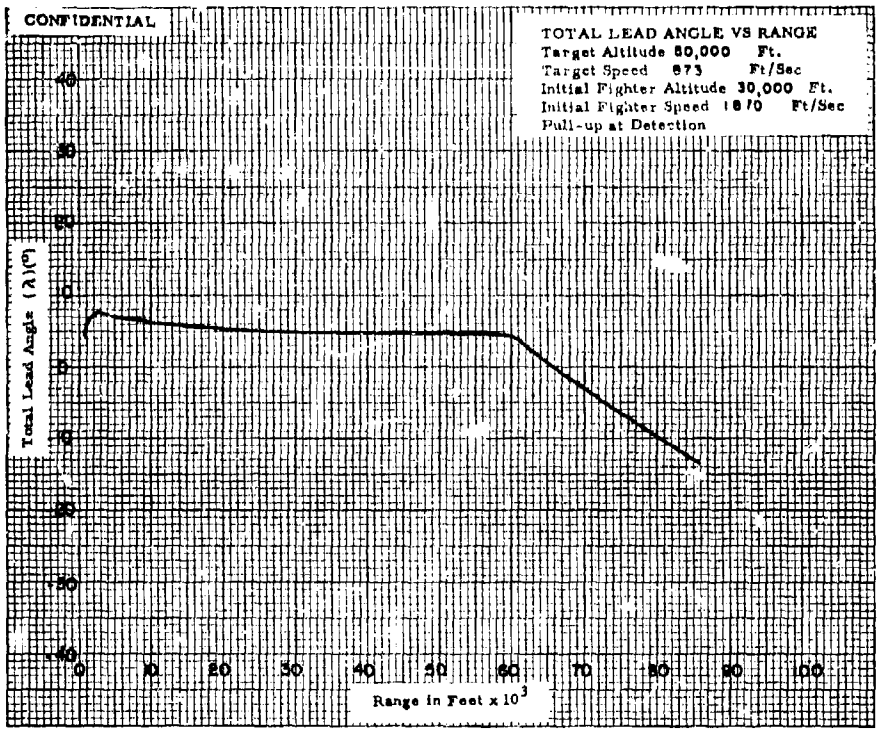

CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1870 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (Δε̇) (Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 461


TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1670 Ft/Sec
Pull-up at Detection
Total Lead Angle (λ)(°)
Range in Feet x 10³

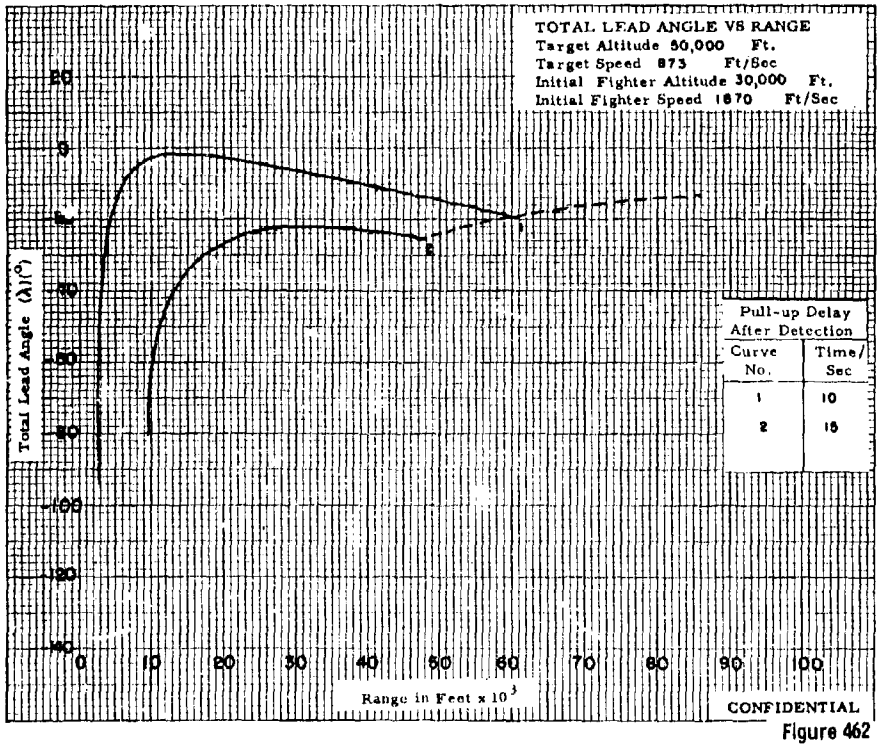
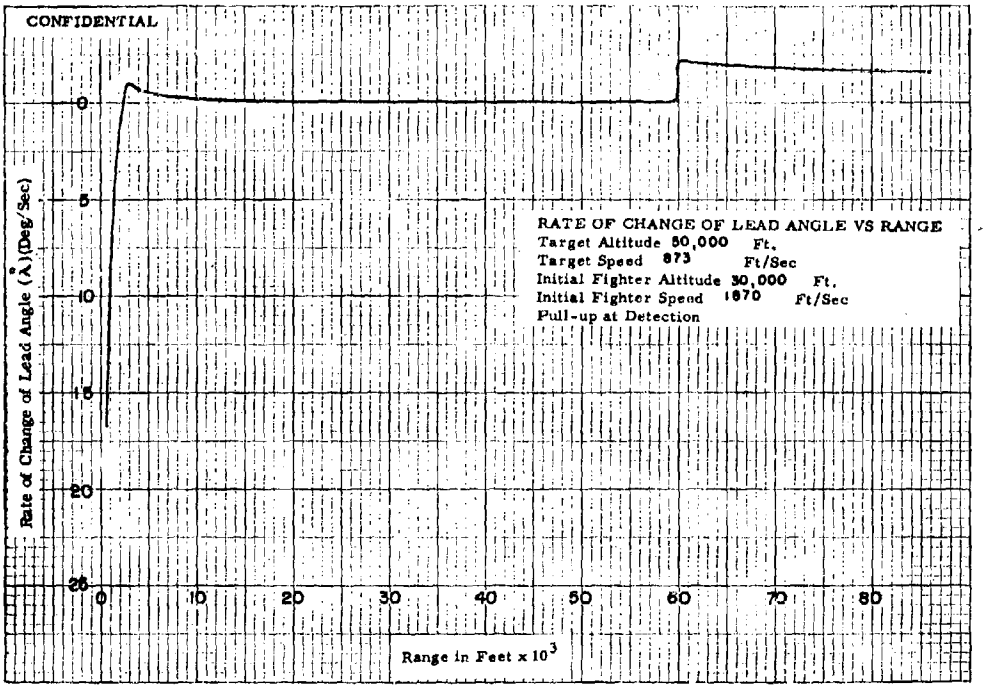

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1670 Ft/Sec
Total Lead Angle (λ)(°)
Range in Feet x 10³
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 10
2 | 15

Figure 462


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1870 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-5
-10
-15
-20
-25
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

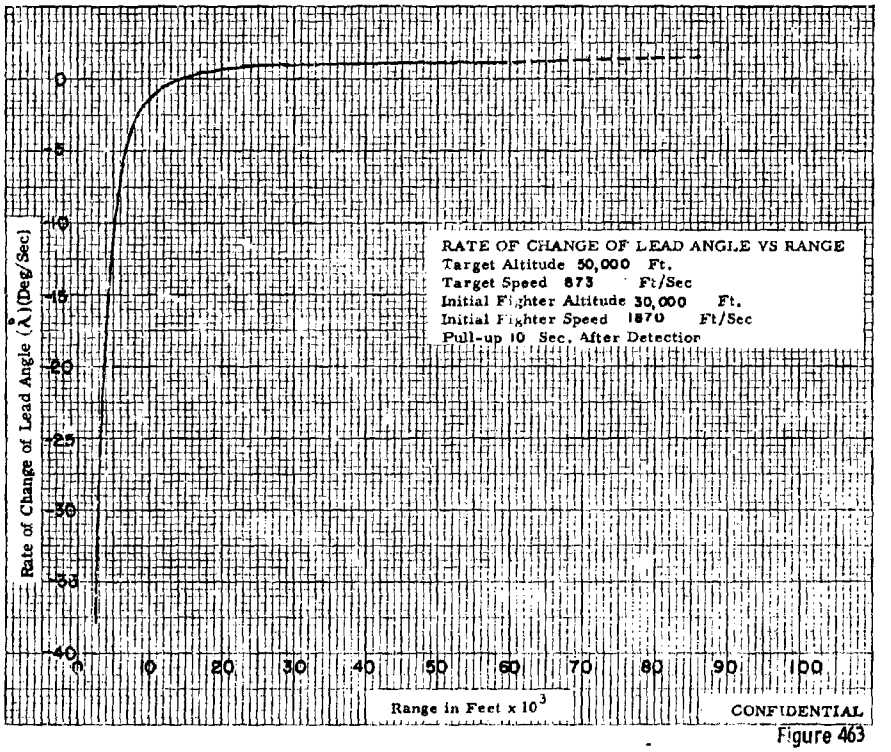

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1870 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-5
-10
-15
-20
-25
-30
-35
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 463

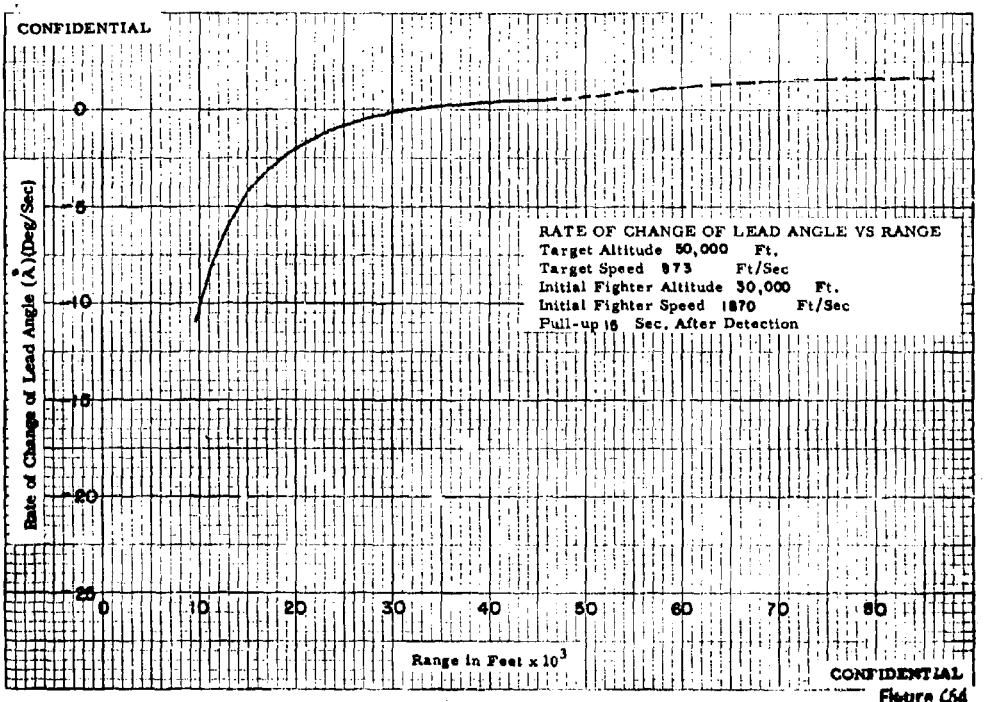


Figure 464

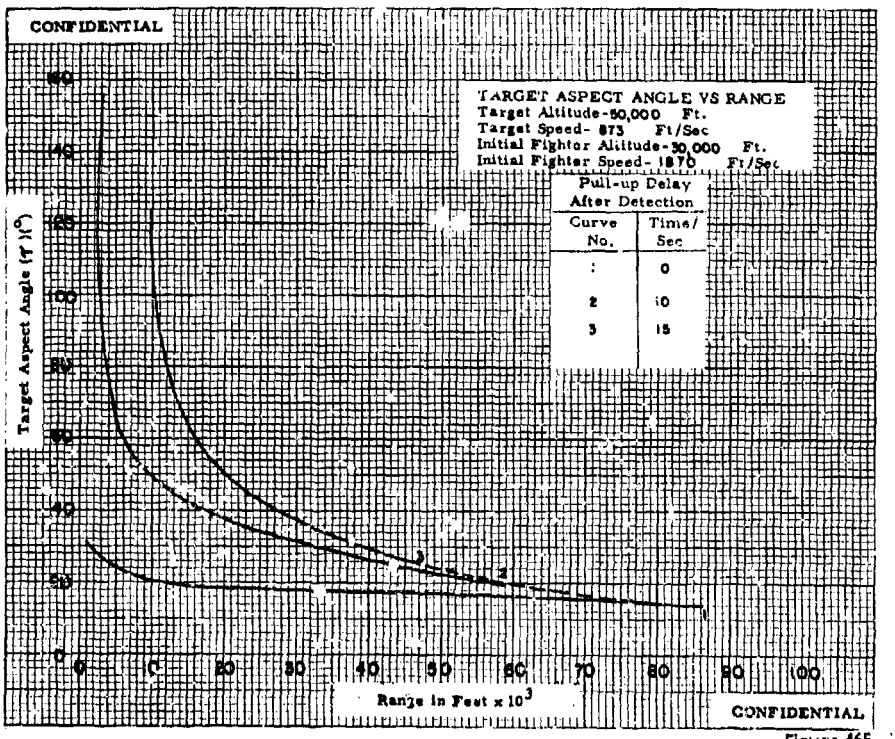
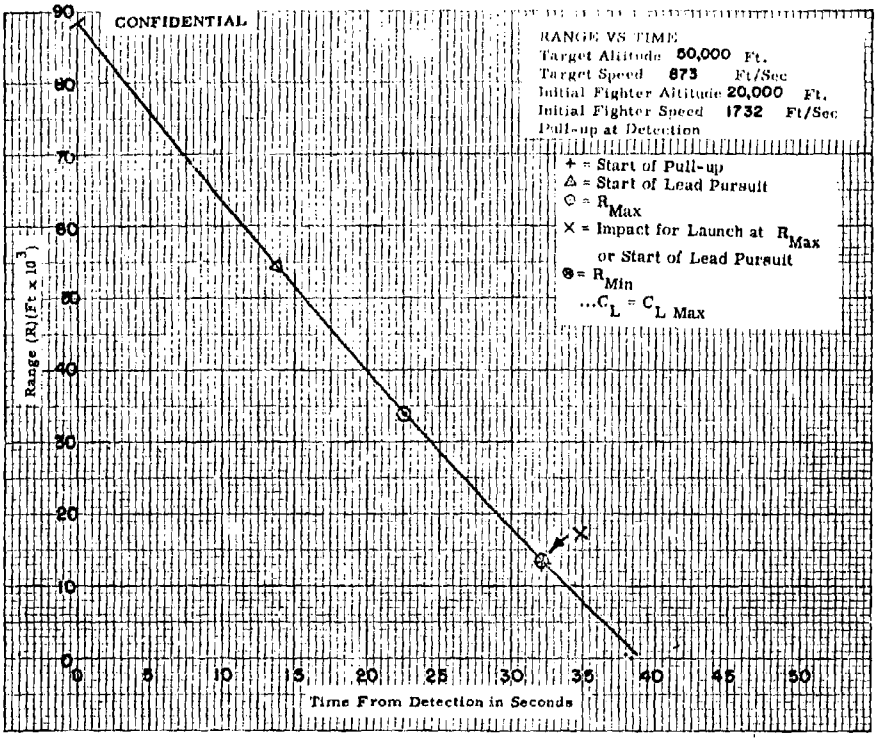


Figure 465


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

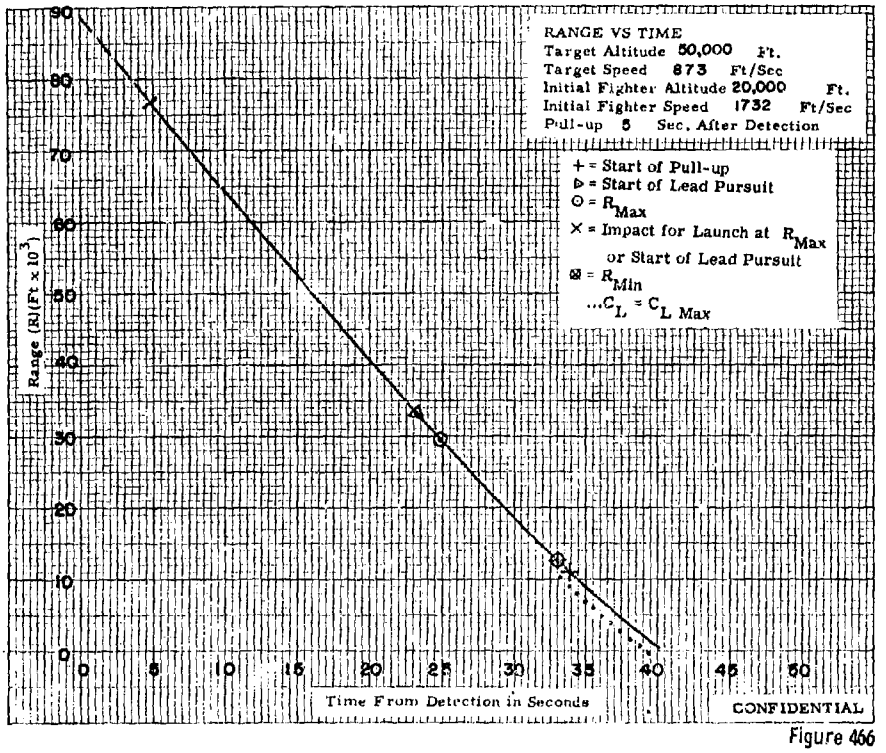
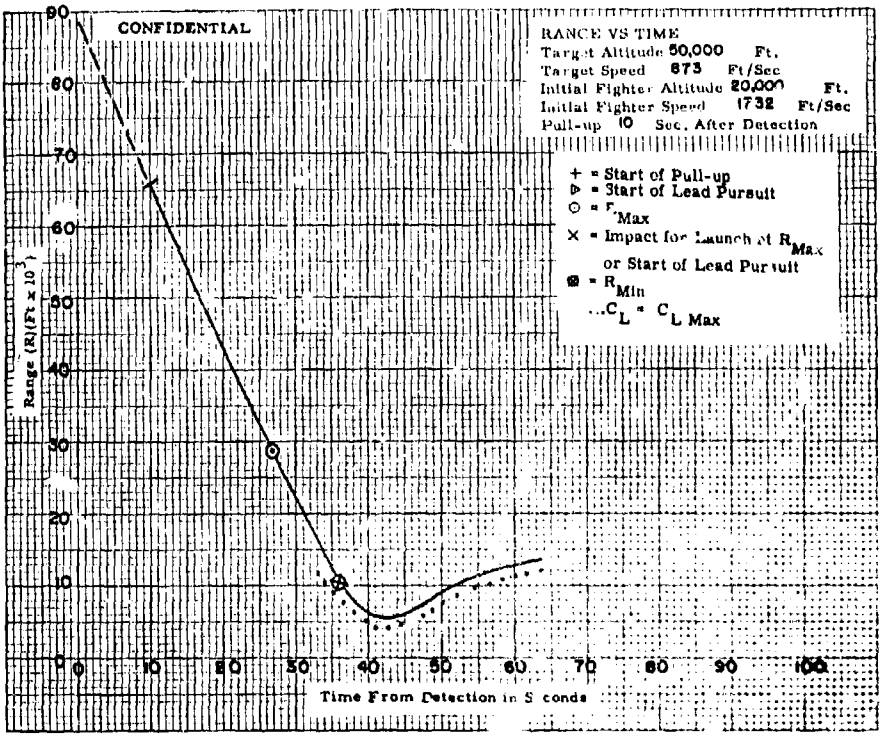

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 5 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 466


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds

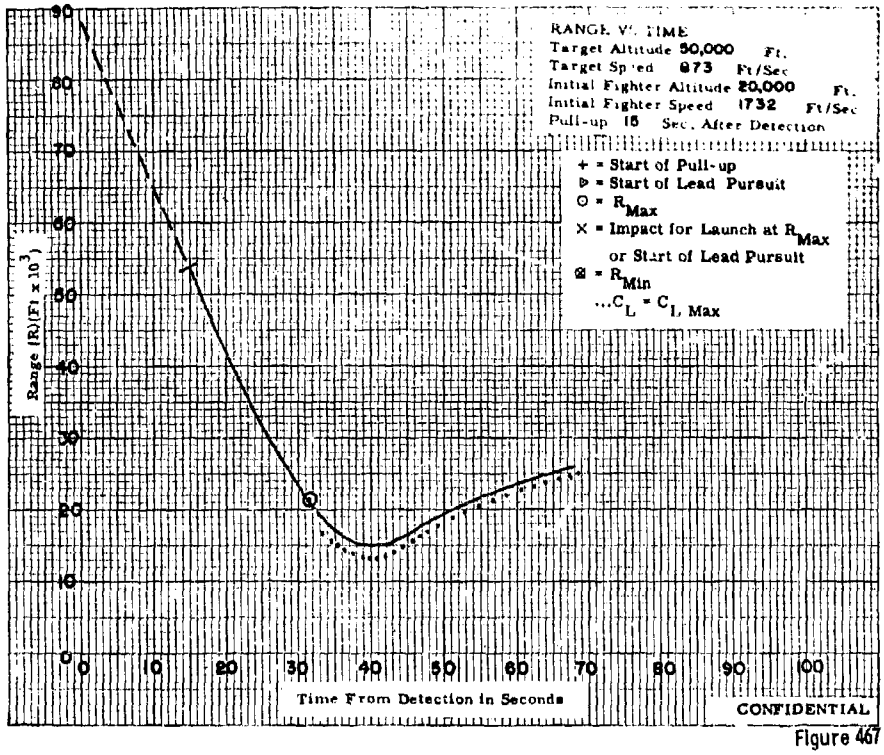
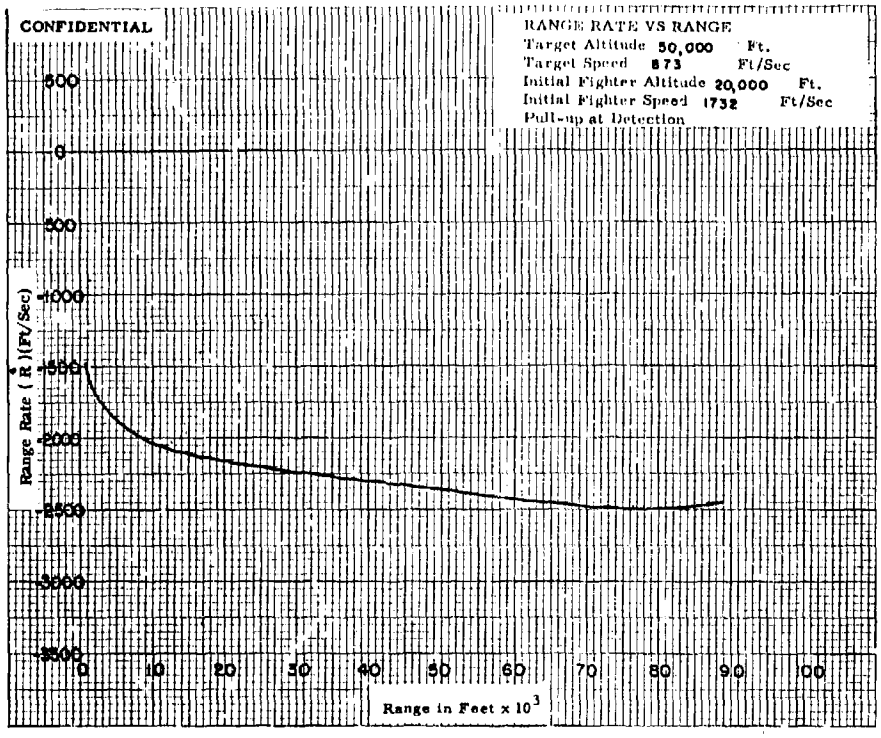

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 467


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up at Detection
Range Rate ($\dot{R}$)(FT/Sec)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

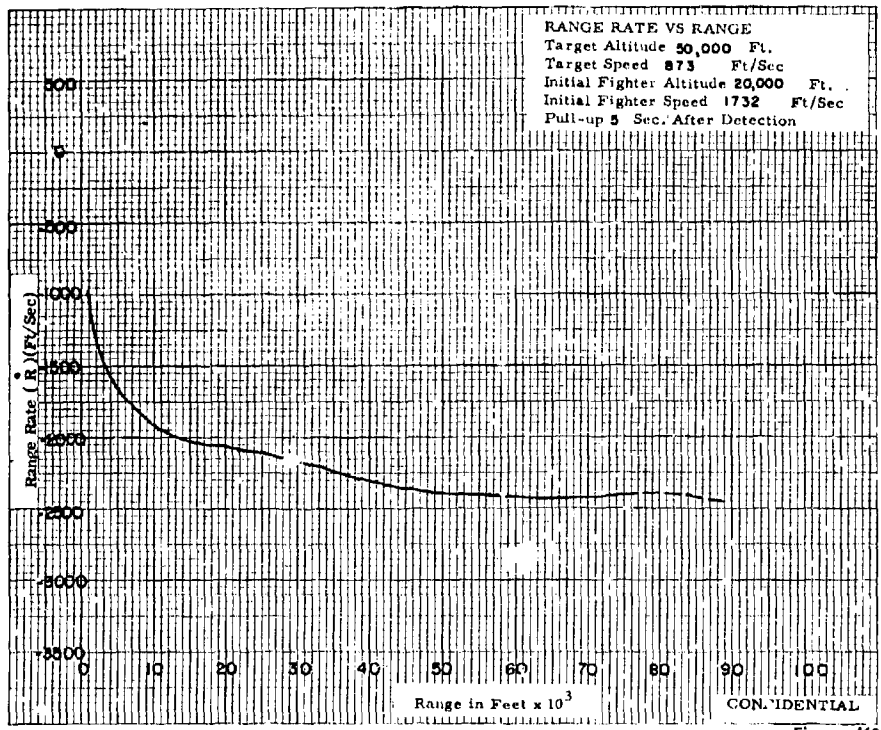
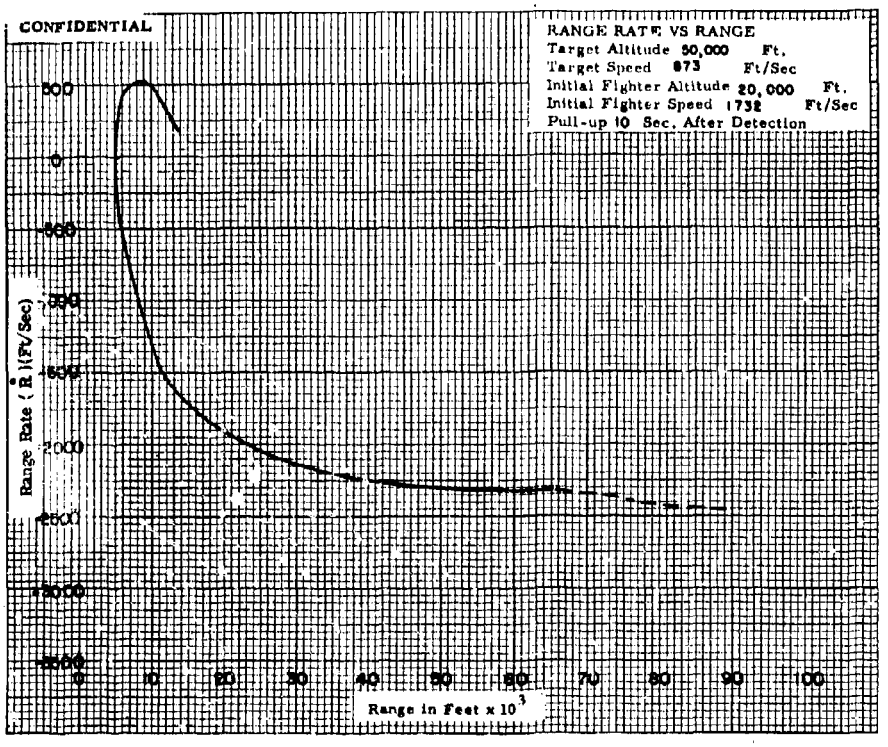

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 5 Sec. After Detection
Range Rate ($\dot{R}$)(FT/Sec)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 468


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate ($\dot{R}$) (Ft/Sec)
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

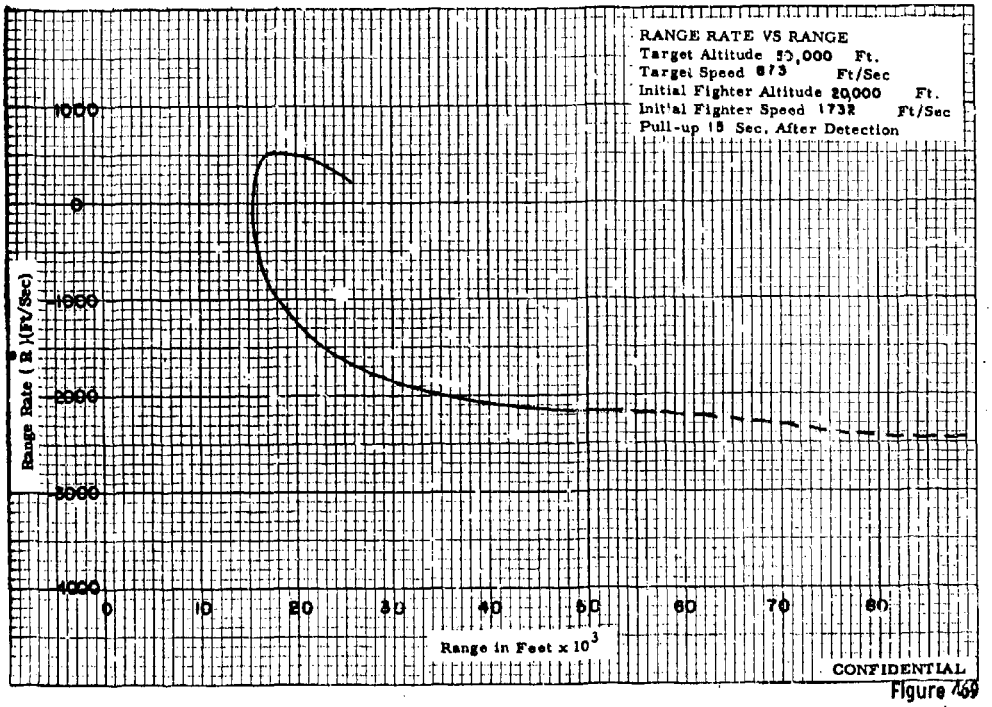
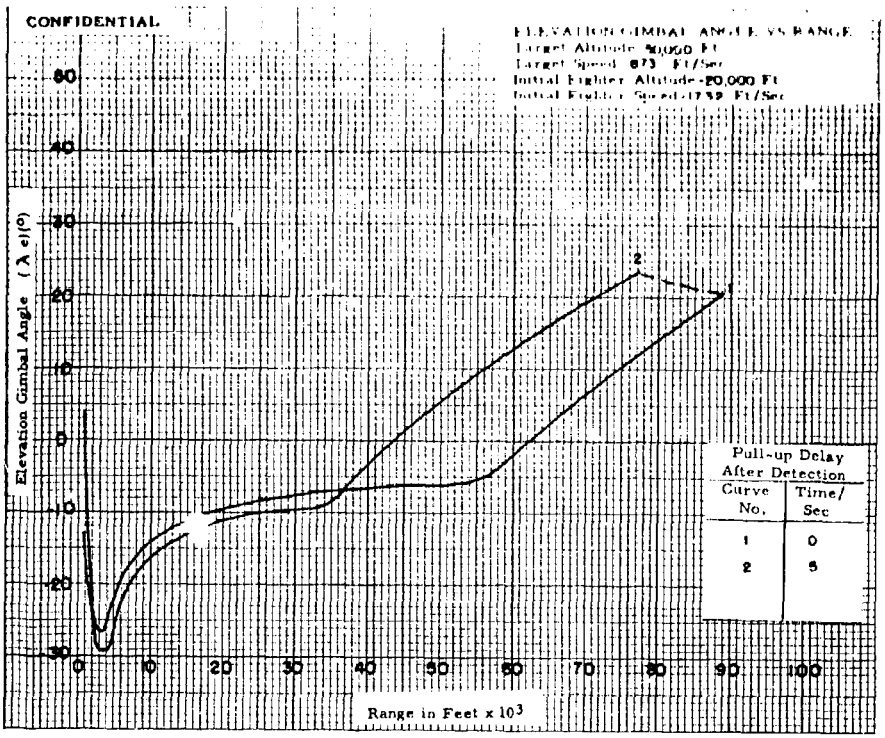
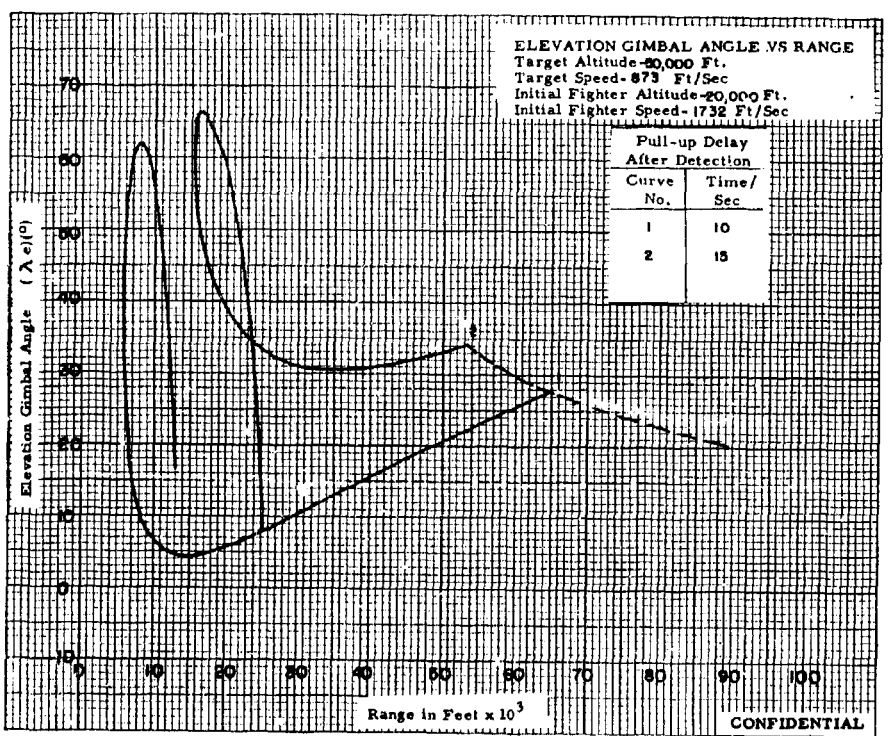

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Range Rate ($\dot{R}$) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 469

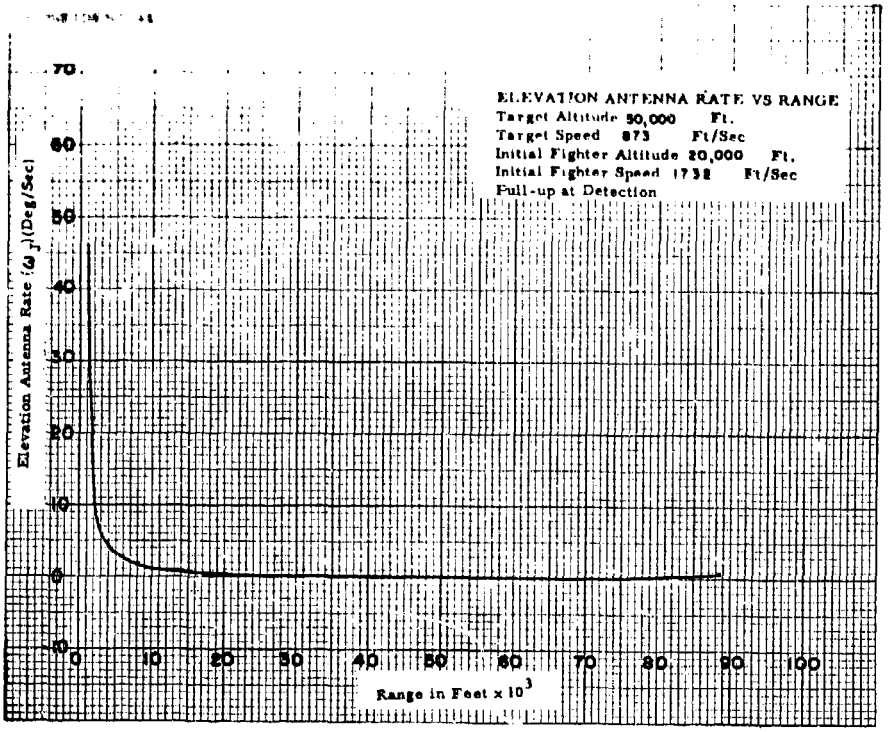
CONFIDENTIAL





CONFIDENTIAL

Figure 470


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Full-up at Detection
Elevation Antenna Rate (ω_E) (Deg/Sec)
70
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

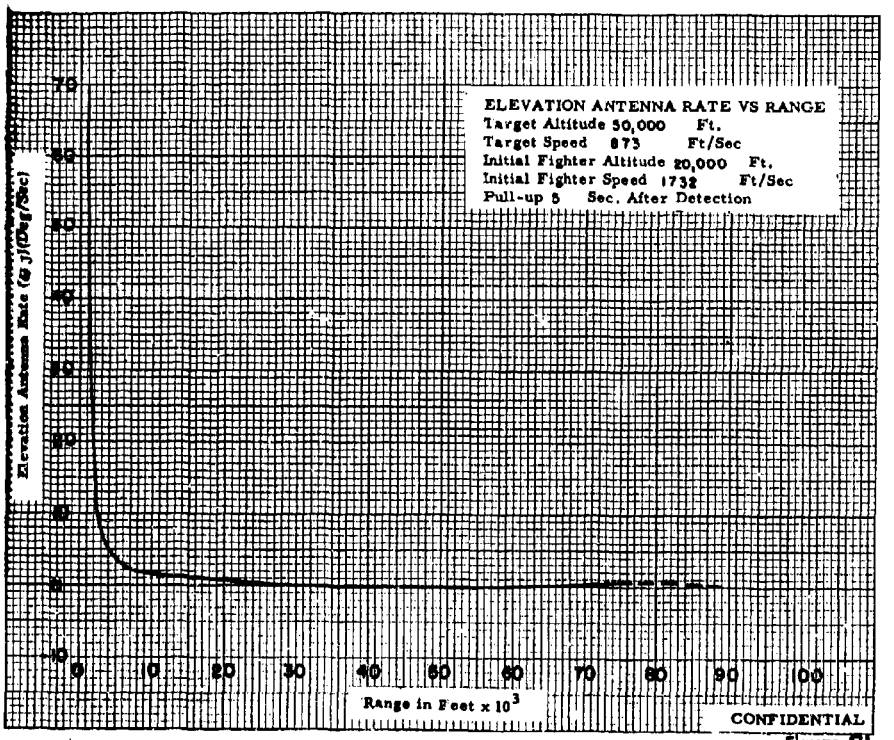
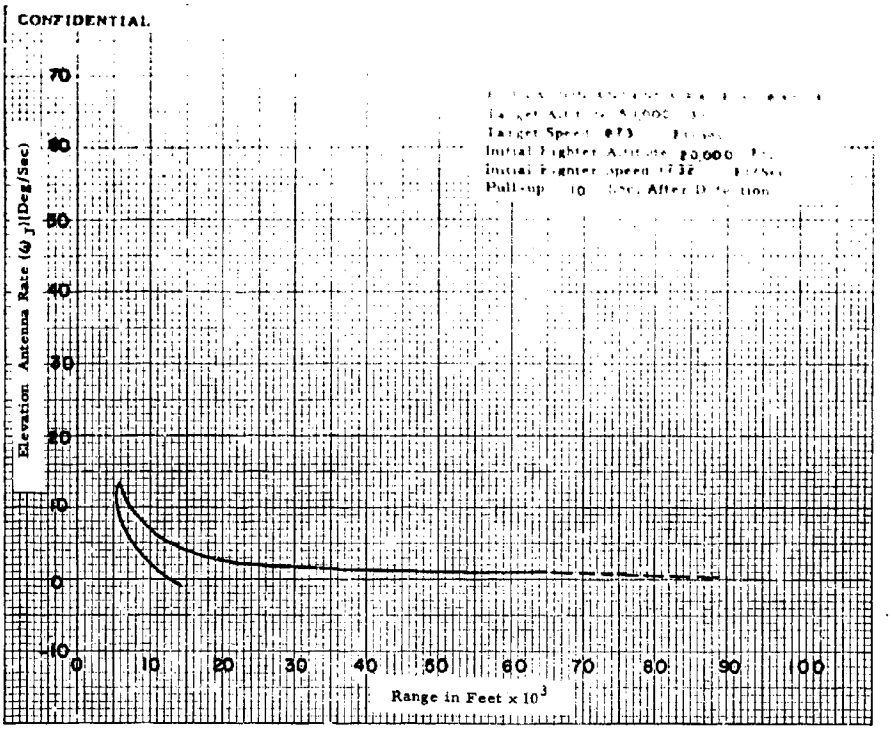

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 5 Sec. After Detection
Elevation Antenna Rate (ω_E) (Deg/Sec)
70
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 471


Elevation Antenna Rate ($\dot{\omega}_y$)(Deg/Sec)
70
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
Target Speed 873
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732
Pull-up 10 Sec. After Detection

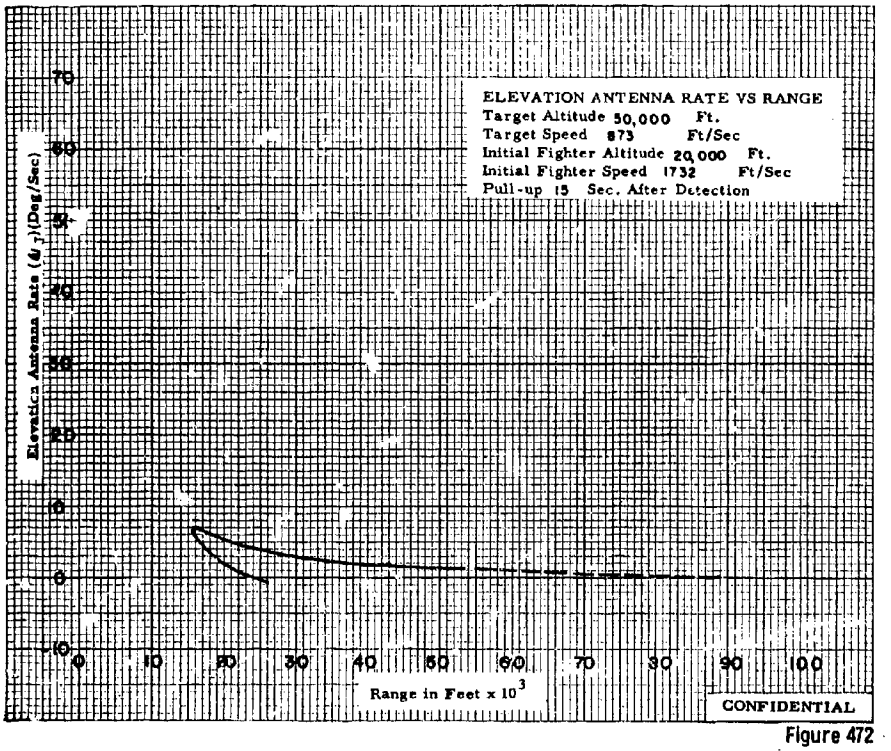
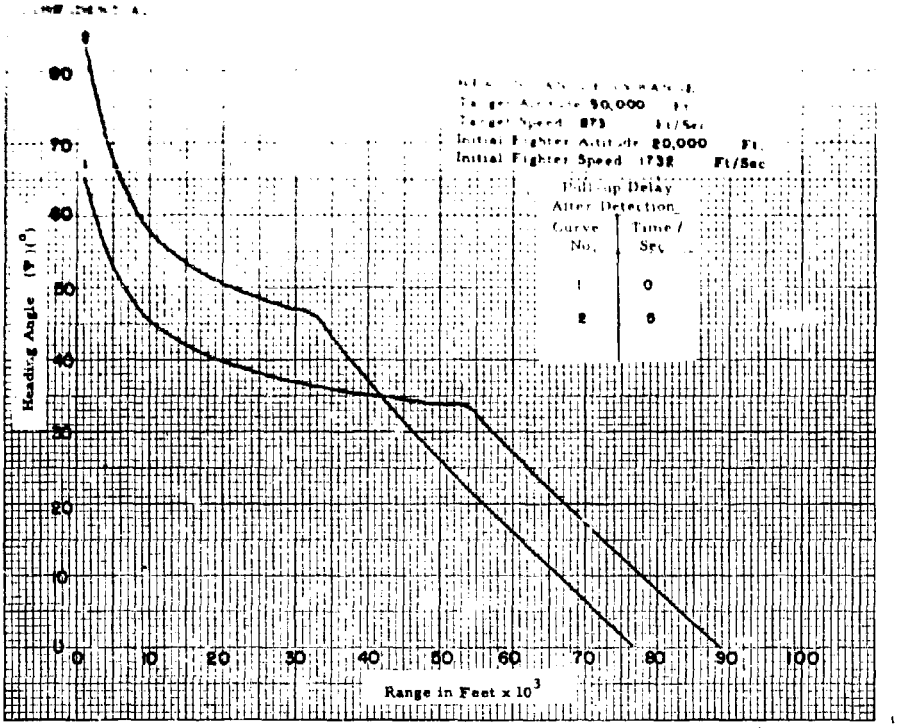

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Elevation Antenna Rate ($\dot{\omega}_y$)(Deg/Sec)
70
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 472


Target Altitude 50,000 Ft
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time / Sec
1 | 0
2 | 6
Heading Angle (Ψ)(°)
Range in Feet x 10³

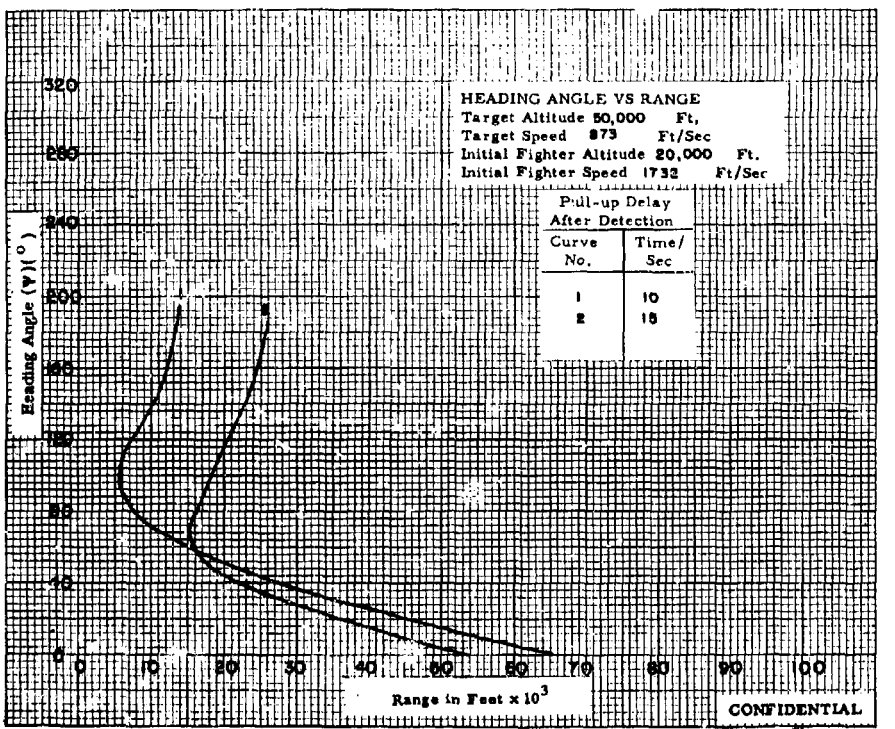
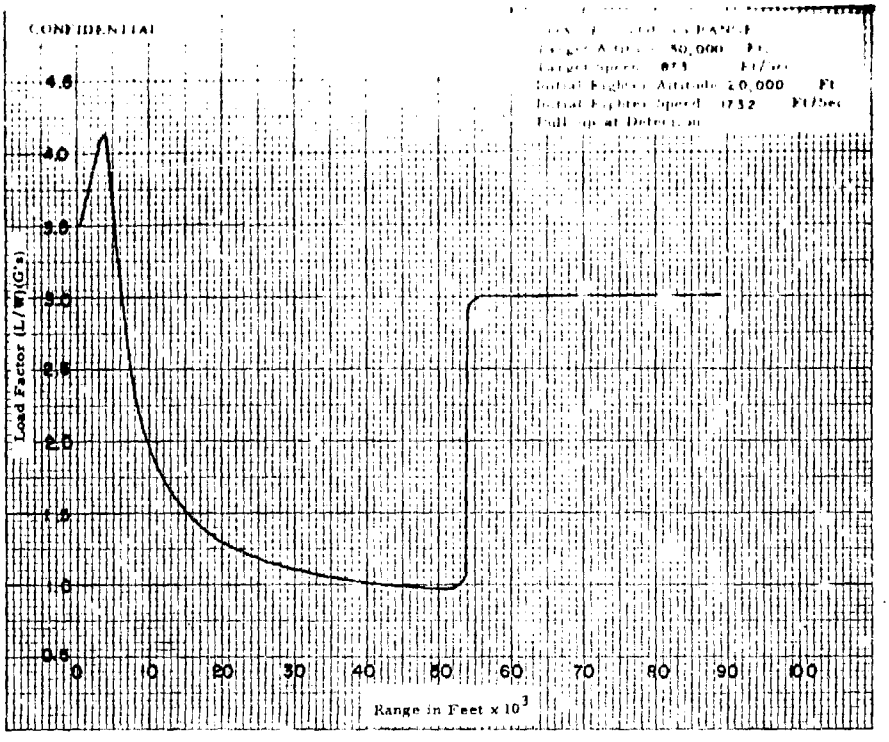

HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft,
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 10
2 | 18
Heading Angle (Ψ)(°)
Range in Feet x 10³
CONFIDENTIAL

Figure 473


CONFIDENTIAL
Load Factor (L/W)(G's)
Range in Feet x 10^3

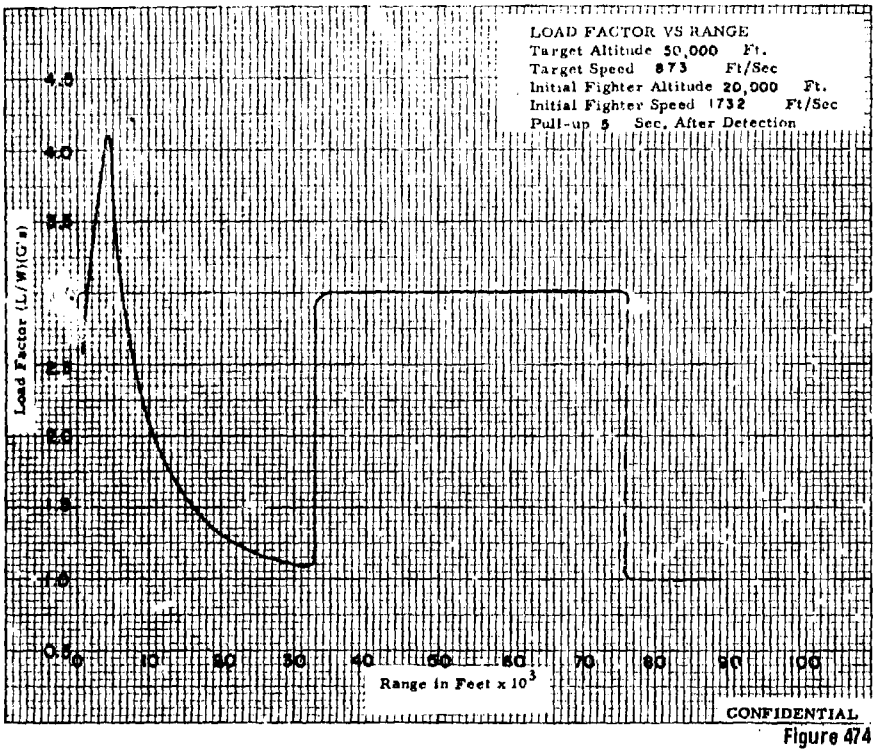
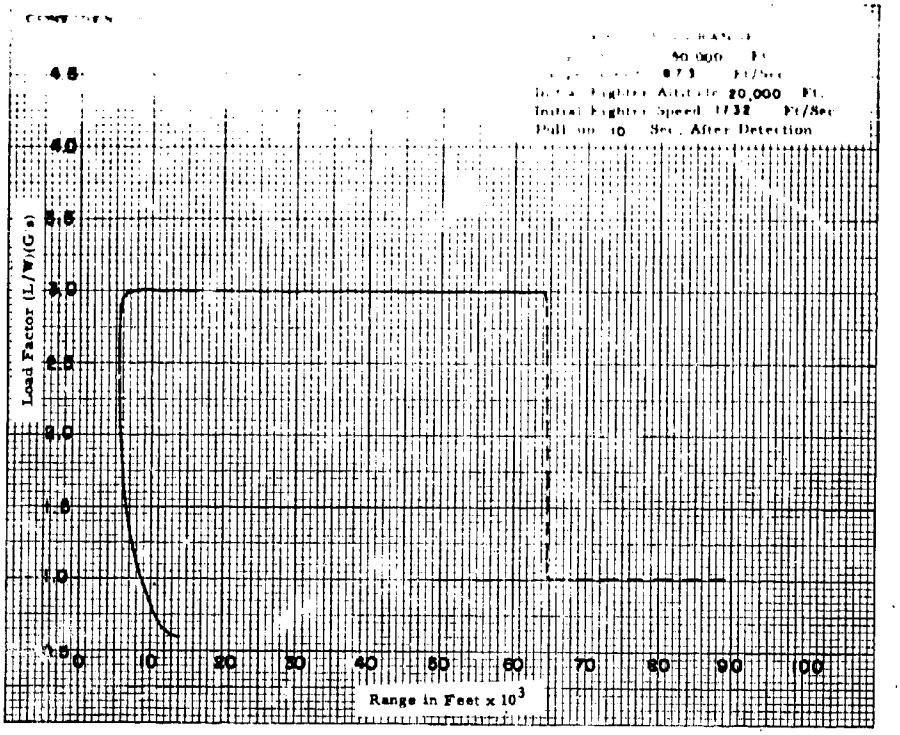

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 5 Sec. After Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

Figure 474


Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Load Factor (L/W)(G's)
Range in Feet x 10^3

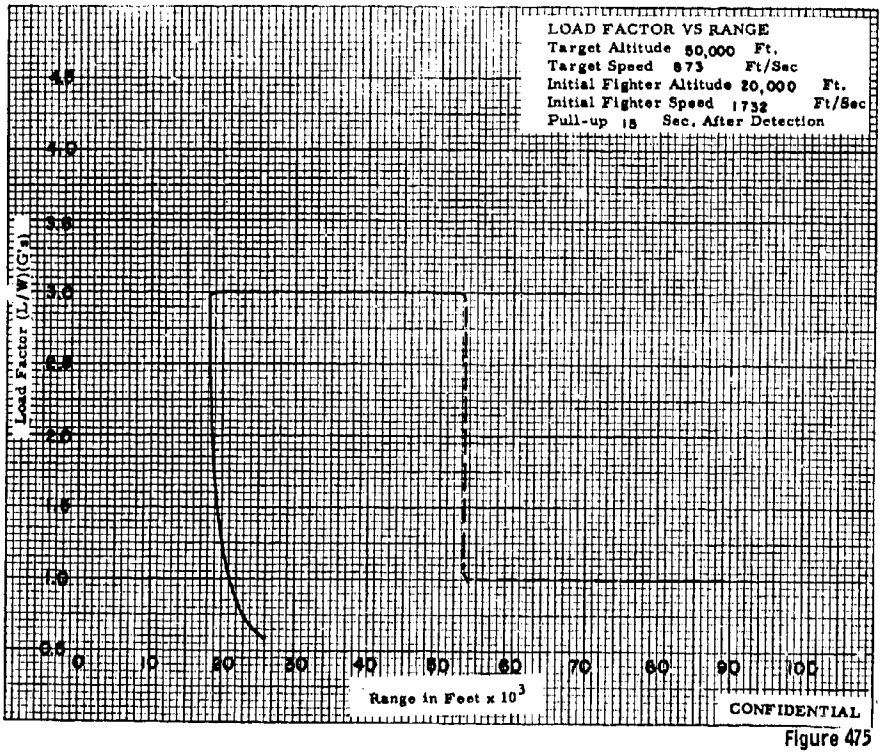
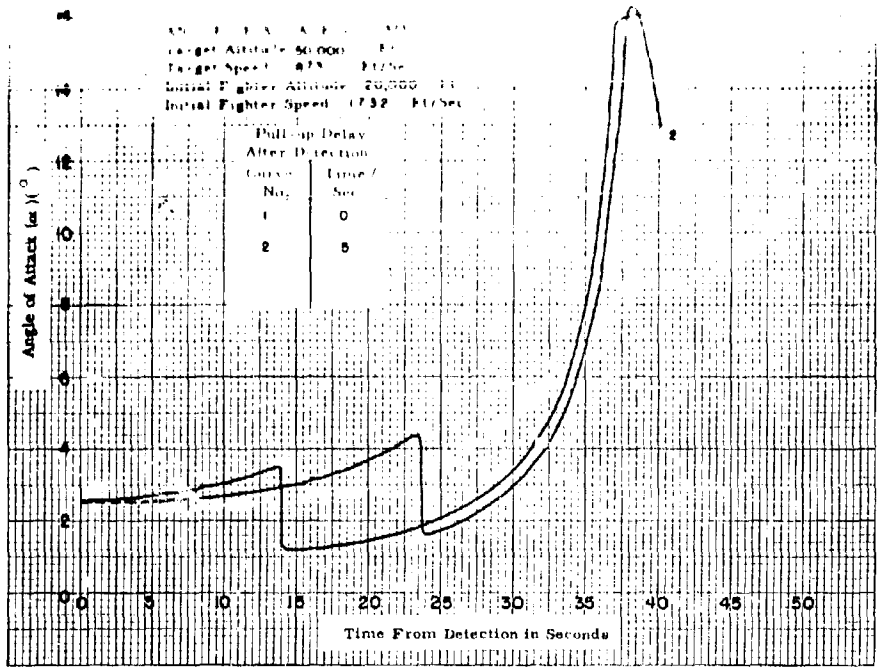
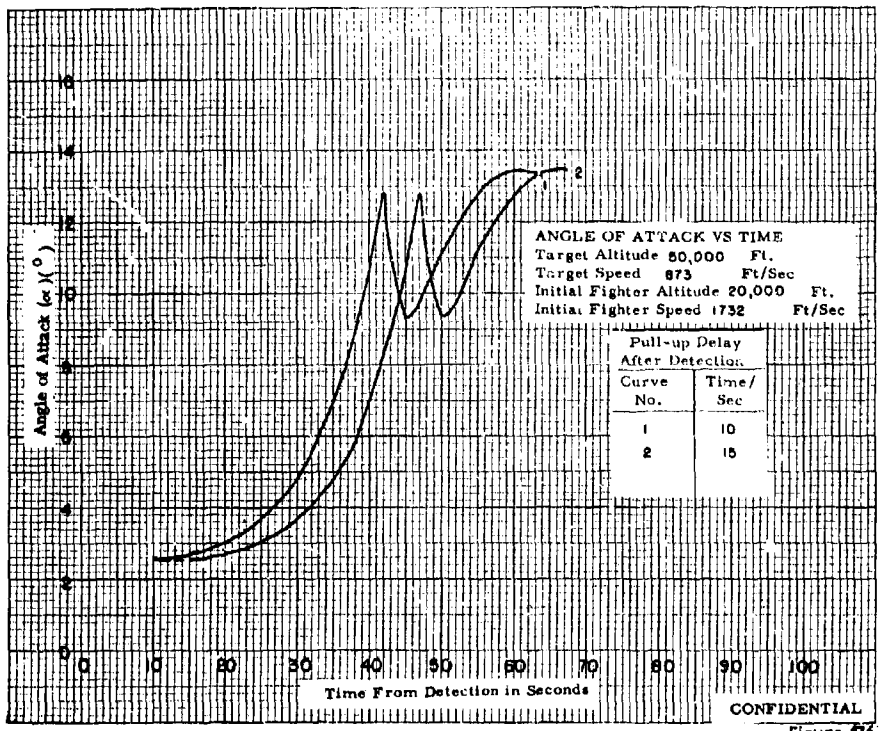

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

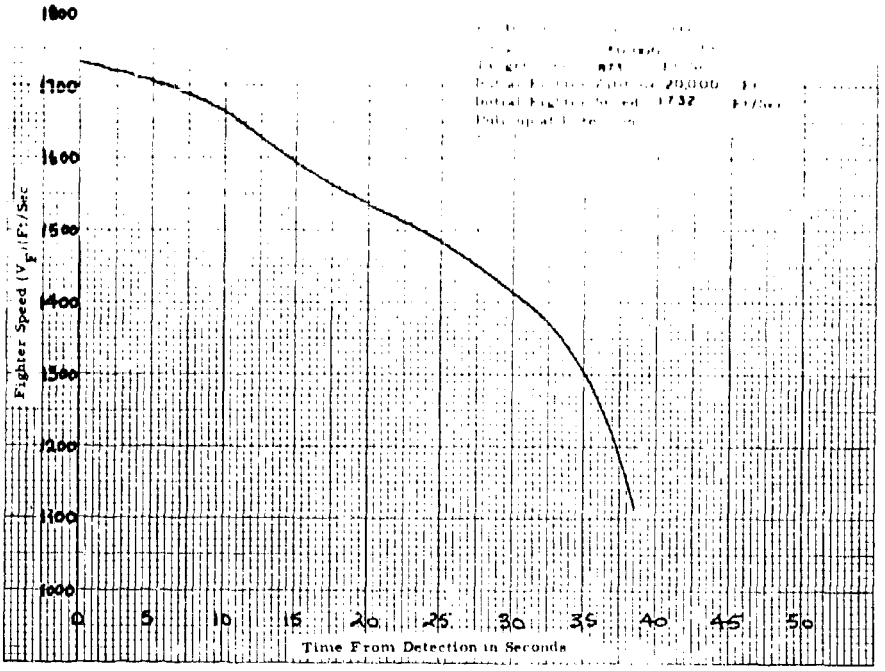
Figure 475

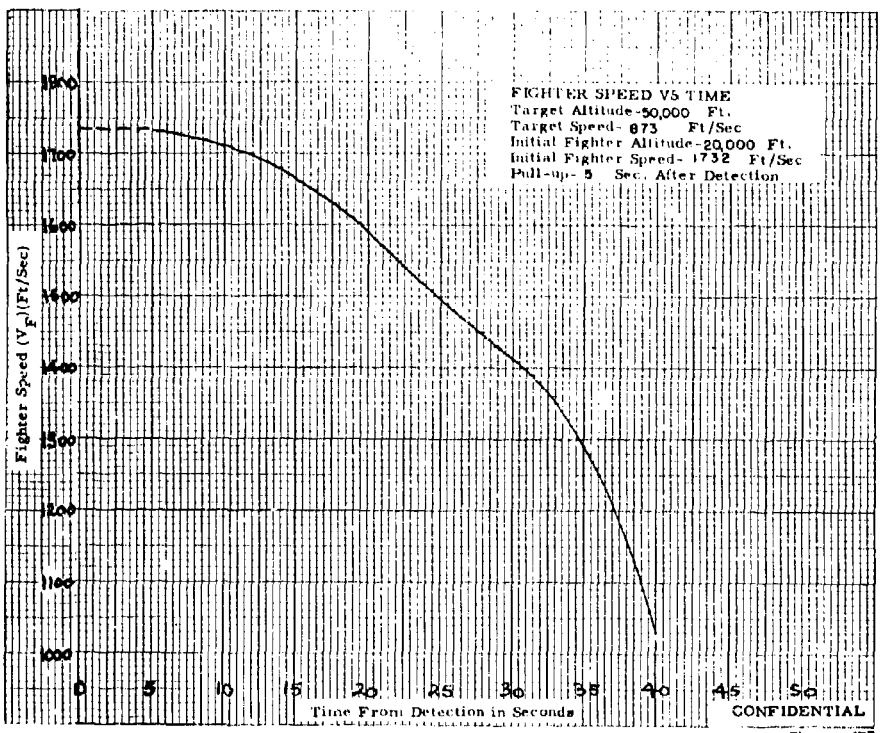




CONFIDENTIAL

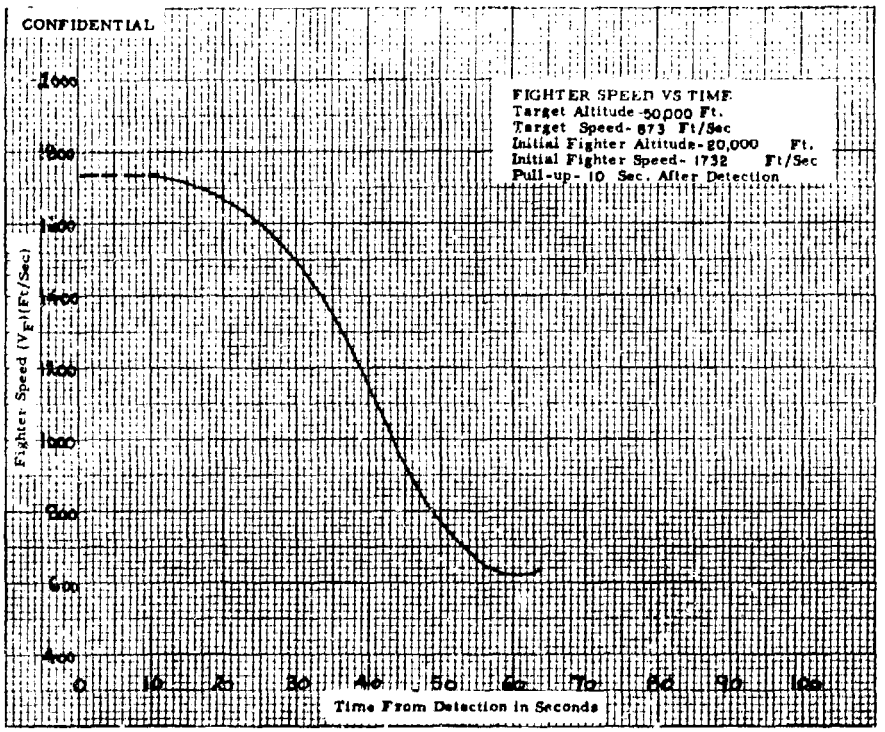
Figure 76





CONFIDENTIAL

Figure 477


FIGHTER SPEED VS TIME
Target Altitude-50,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1732 Ft/Sec
Pull-up- 10 Sec. After Detection
Fighter Speed (V_F)(Ft/Sec)
Time From Detection in Seconds

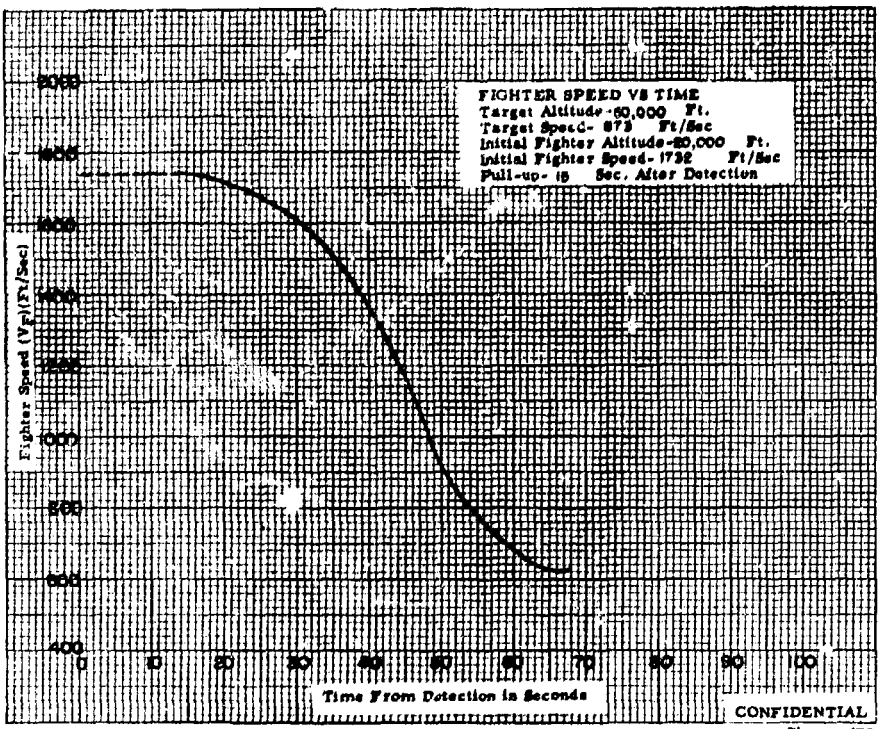

FIGHTER SPEED VS TIME
Target Altitude-60,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1732 Ft/Sec
Pull-up- 15 Sec. After Detection
Fighter Speed (V_F)(Ft/Sec)
Time From Detection in Seconds

Figure 478

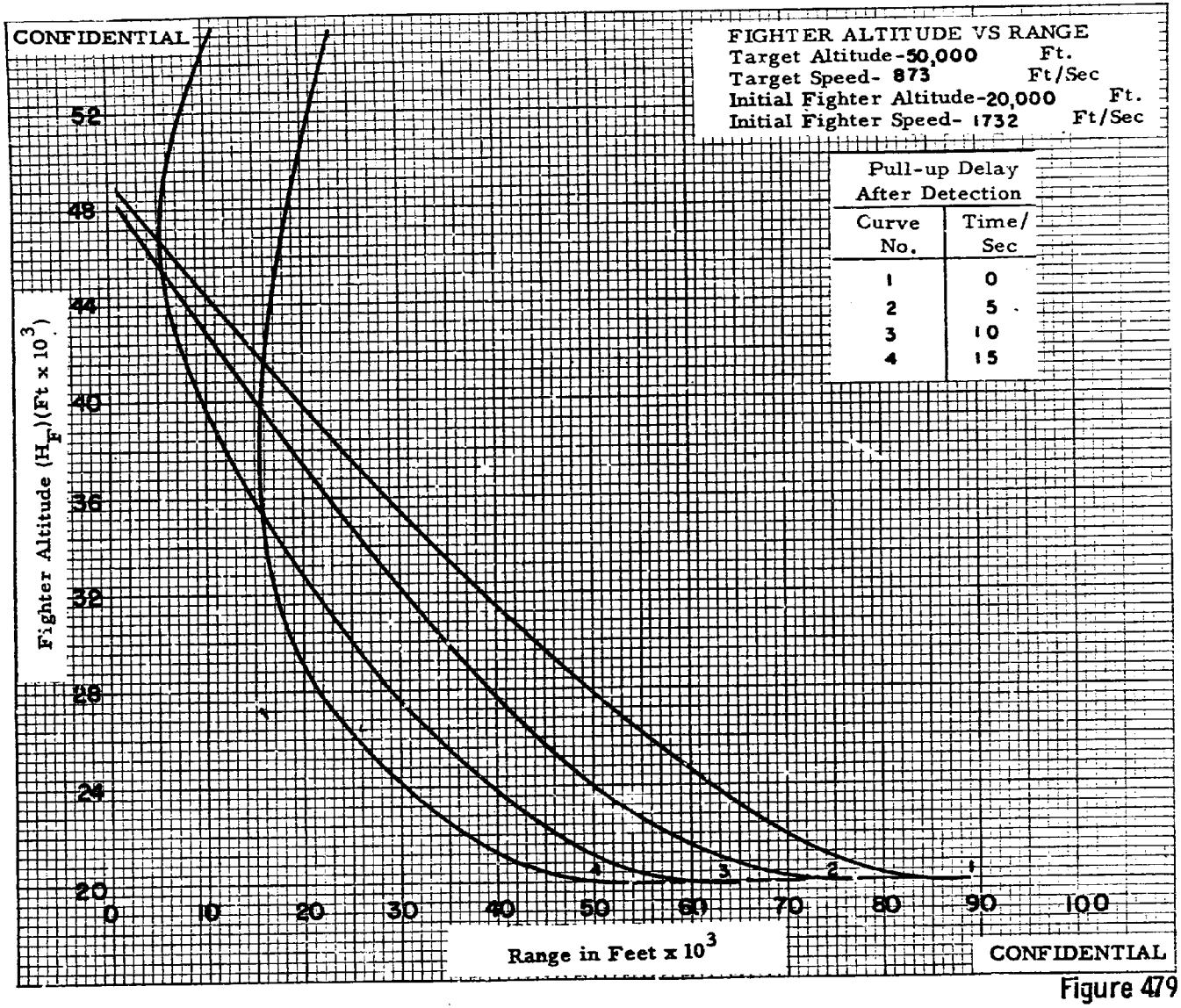
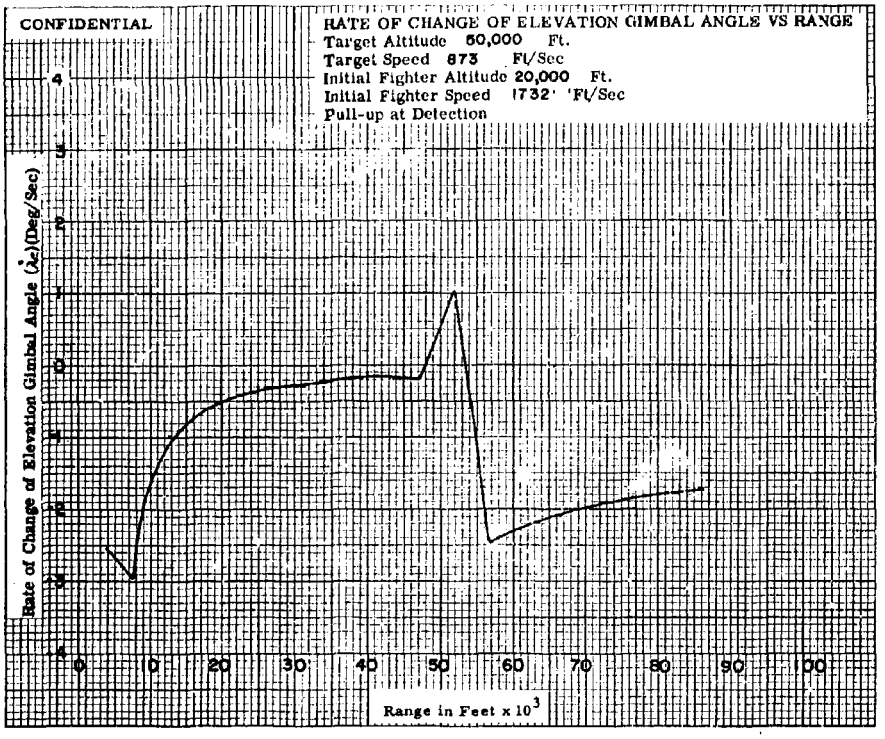

CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1732 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 5
3 | 10
4 | 15
Fighter Altitude (H_F)(Ft x 10^3)
52
48
44
40
36
32
28
24
20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 479

CONFIDENTIAL



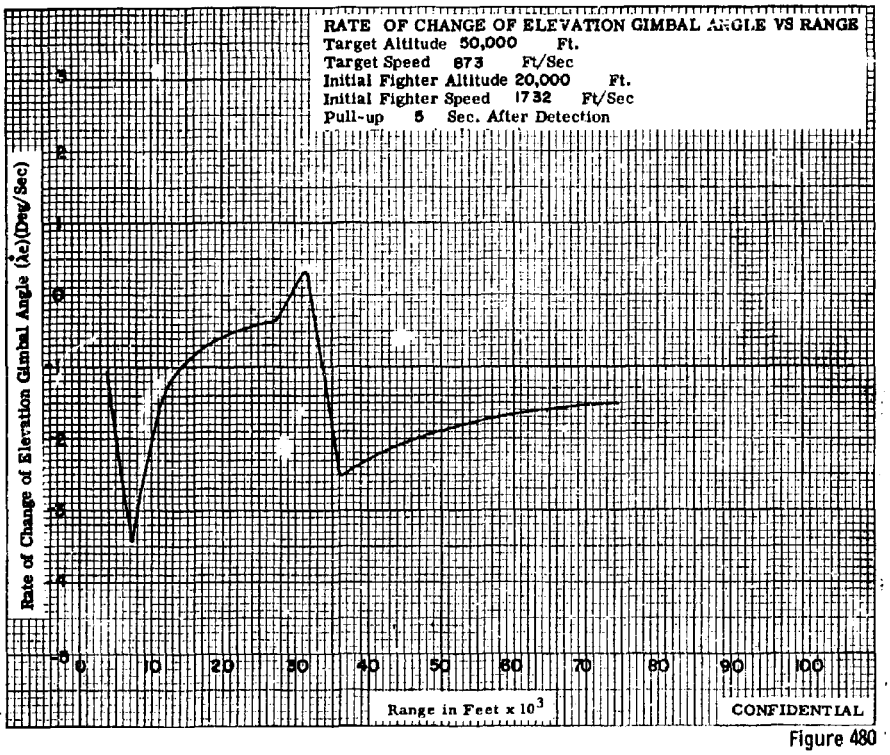
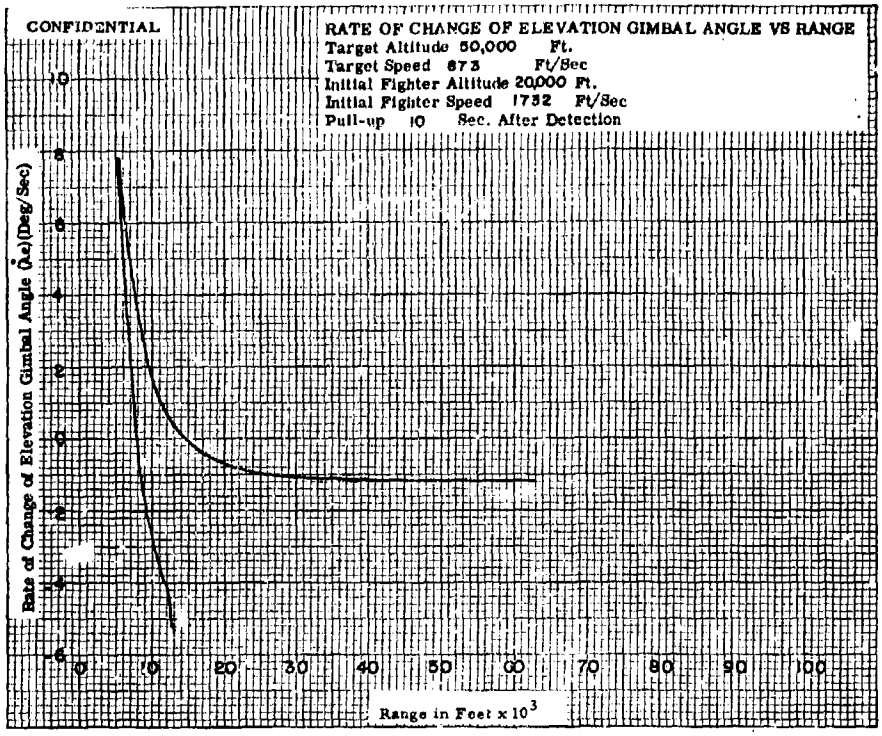


Figure 480


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
10
8
6
4
2
0
-2
-4
-6
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

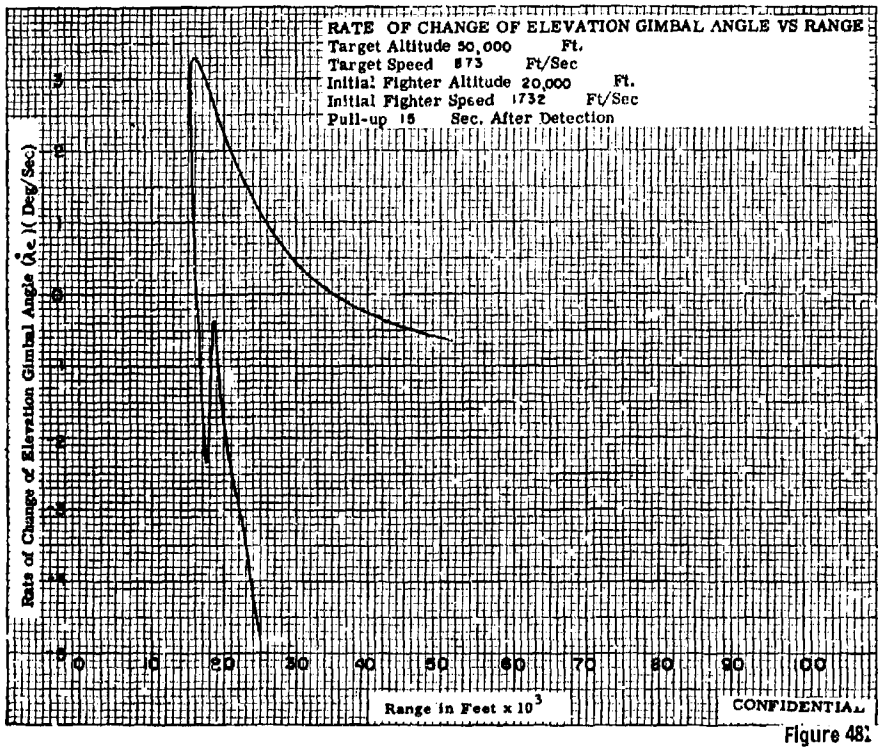
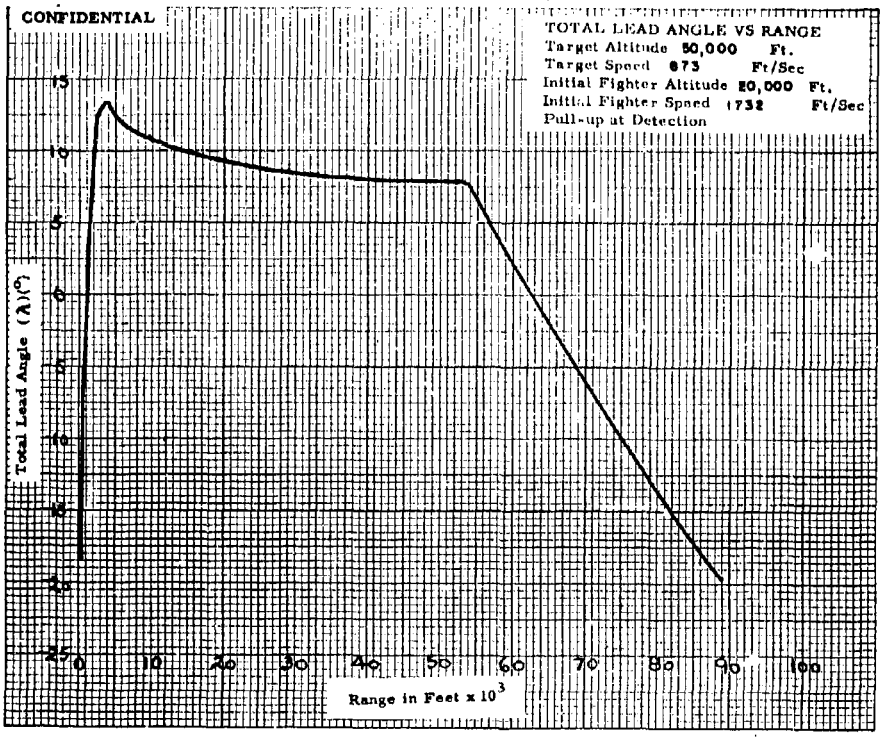
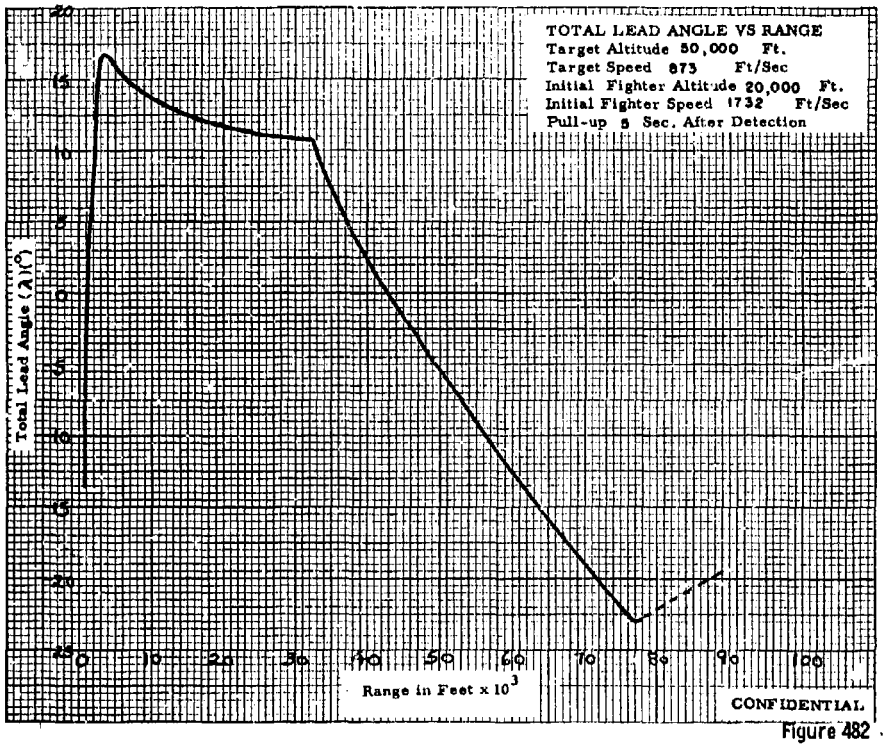

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 48

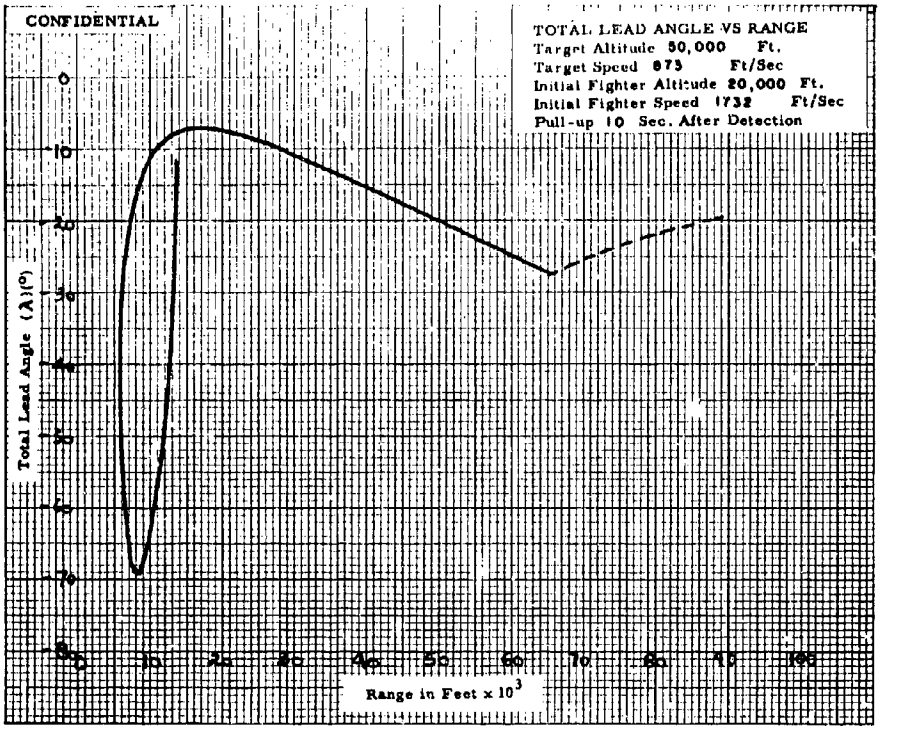
CONFIDENTIAL





CONFIDENTIAL

Figure 482


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 10 Sec. After Detection
Total Lead Angle (λ)(°)
0
10
20
30
40
50
60
70
80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

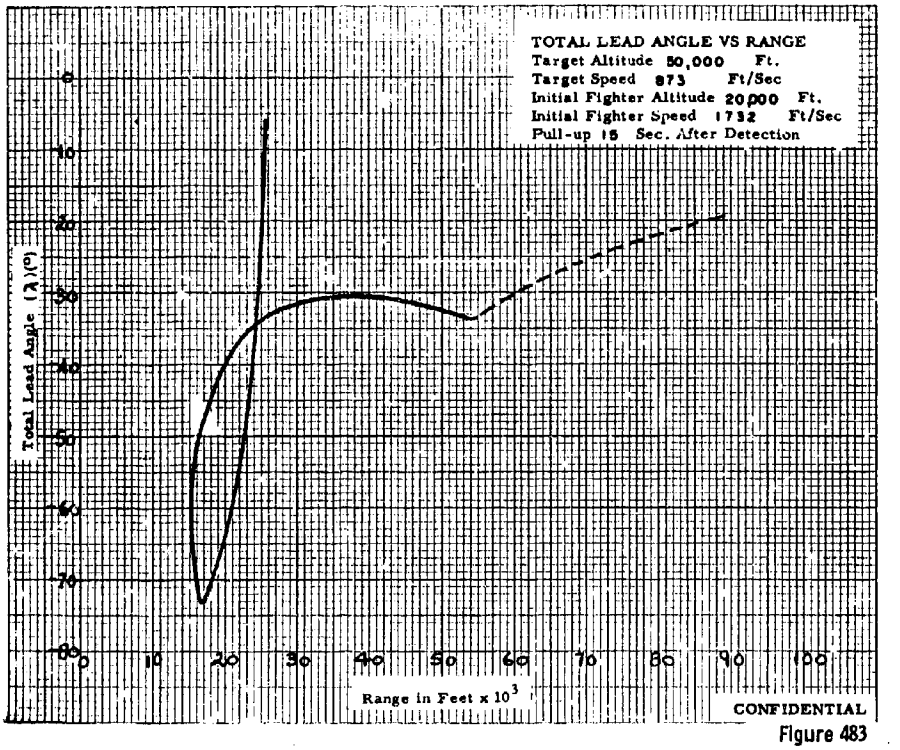
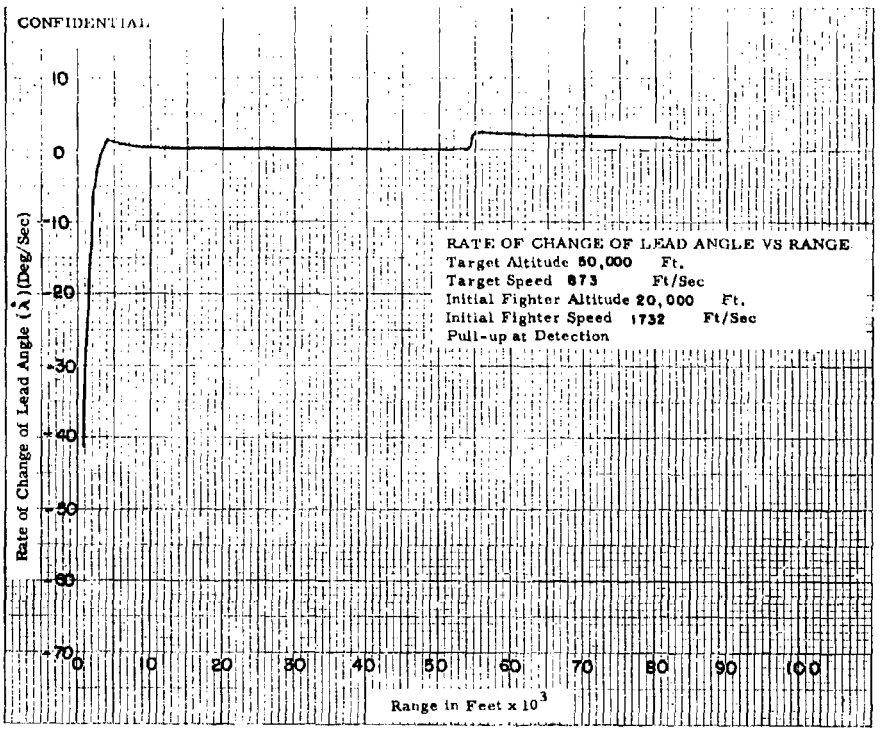

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Total Lead Angle (λ)(°)
0
10
20
30
40
50
60
70
80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 483


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
10
0
-10
-20
-30
-40
-50
-60
-70
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

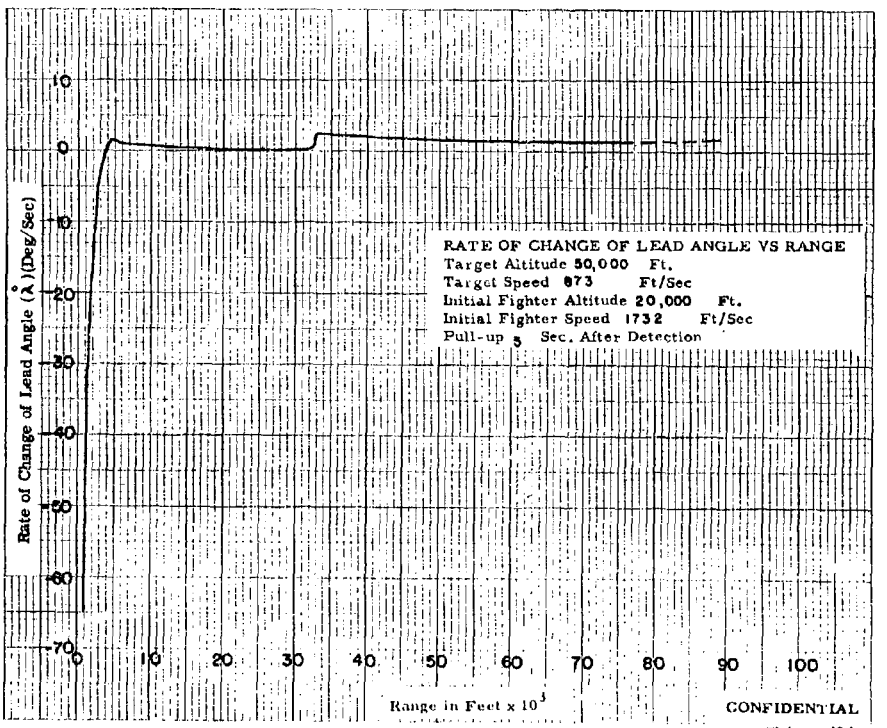
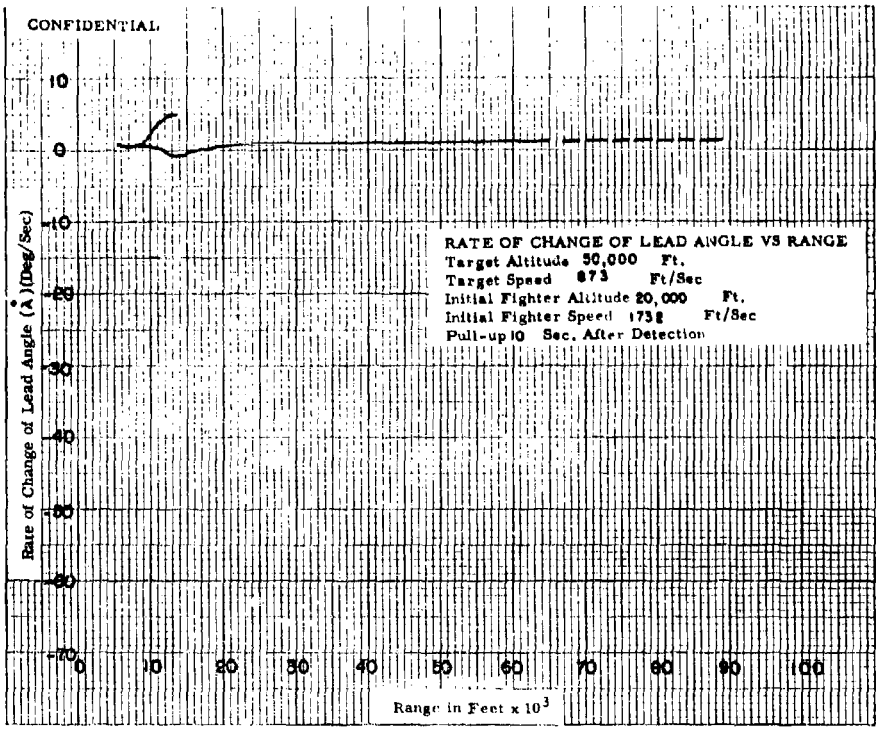

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
10
0
-10
-20
-30
-40
-50
-60
-70
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 484


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1738 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
10
0
-10
-20
-30
-40
-50
-60
-70
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

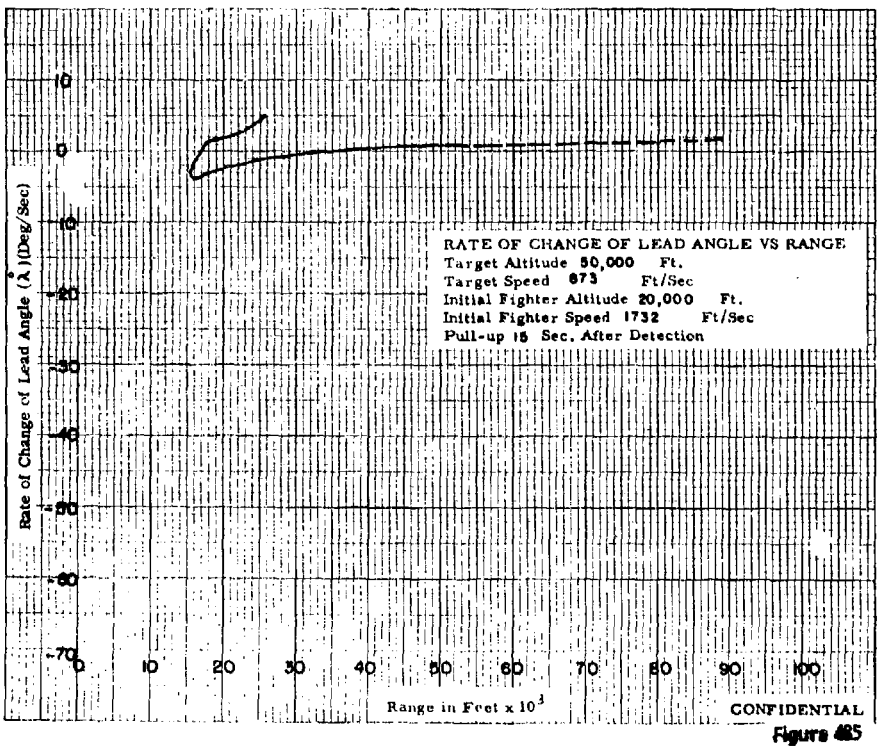
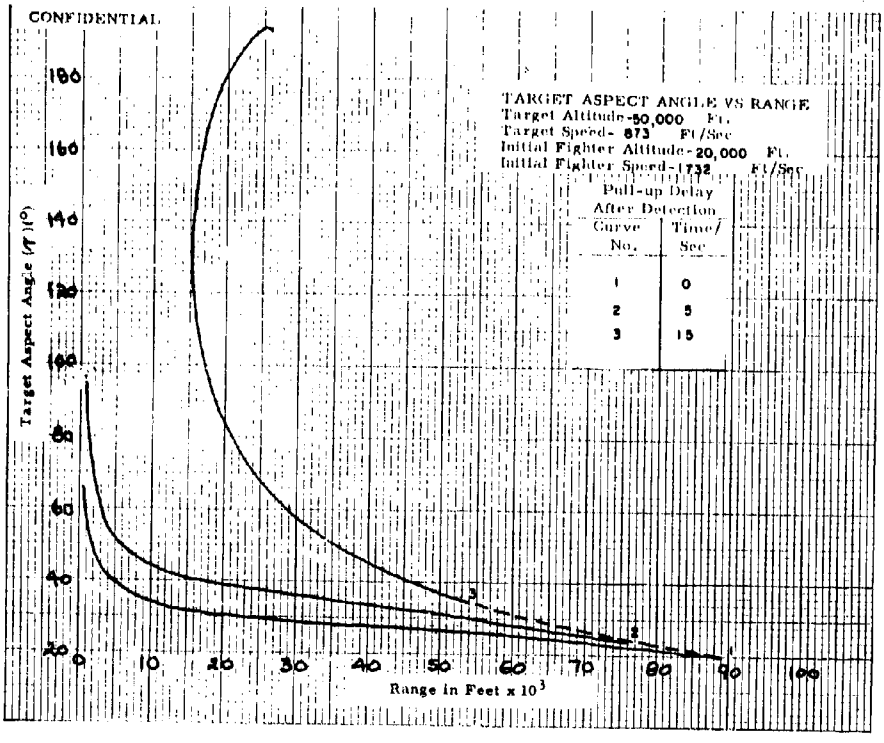

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
10
0
-10
-20
-30
-40
-50
-60
-70
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 485


TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed-1732 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 5
3 | 15
Target Aspect Angle (ψ)°
Range in Feet x 10³

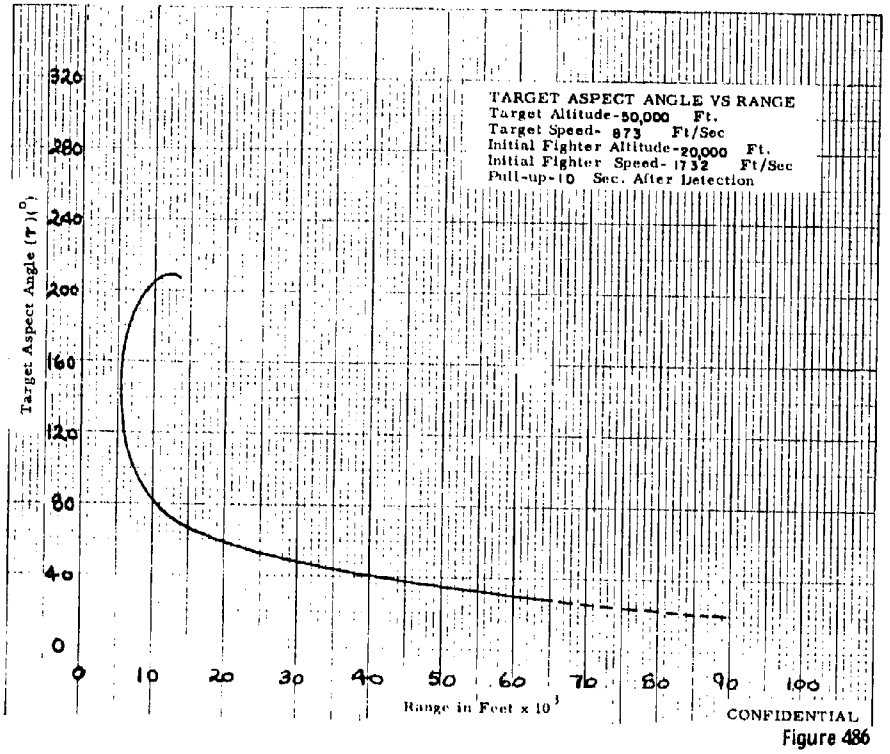
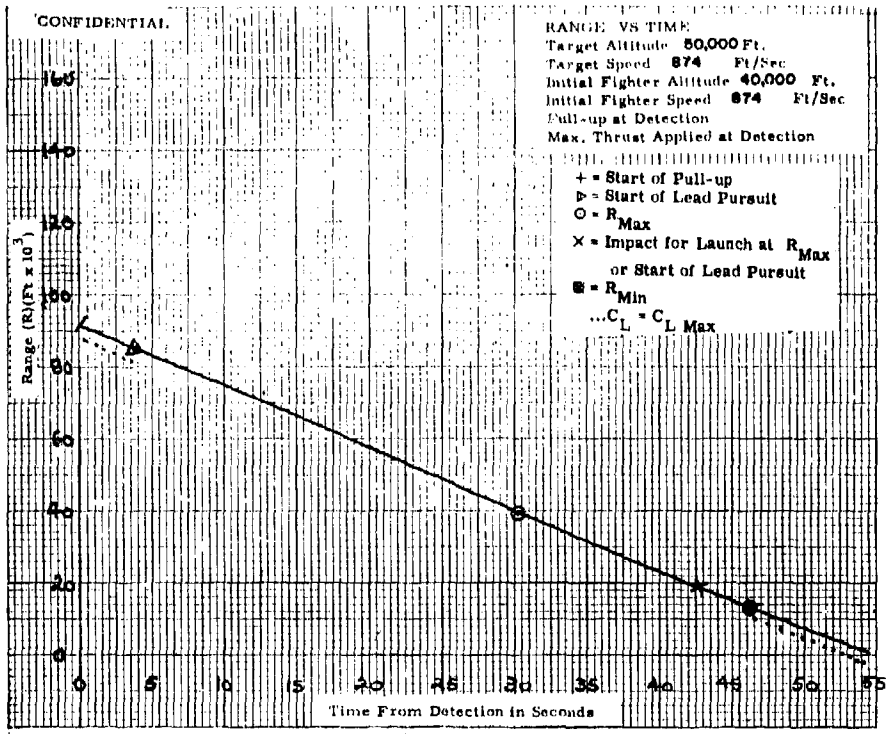

TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1732 Ft/Sec
Pull-up-10 Sec. After Detection
Target Aspect Angle (ψ)°
Range in Feet x 10³

Figure 486


RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
● = R Min
...C L = C L Max
Range (R)(Ft x 10³)
0
20
40
60
80
100
120
140
160
0
5
10
15
20
25
30
35
40
45
50
55
Time From Detection in Seconds

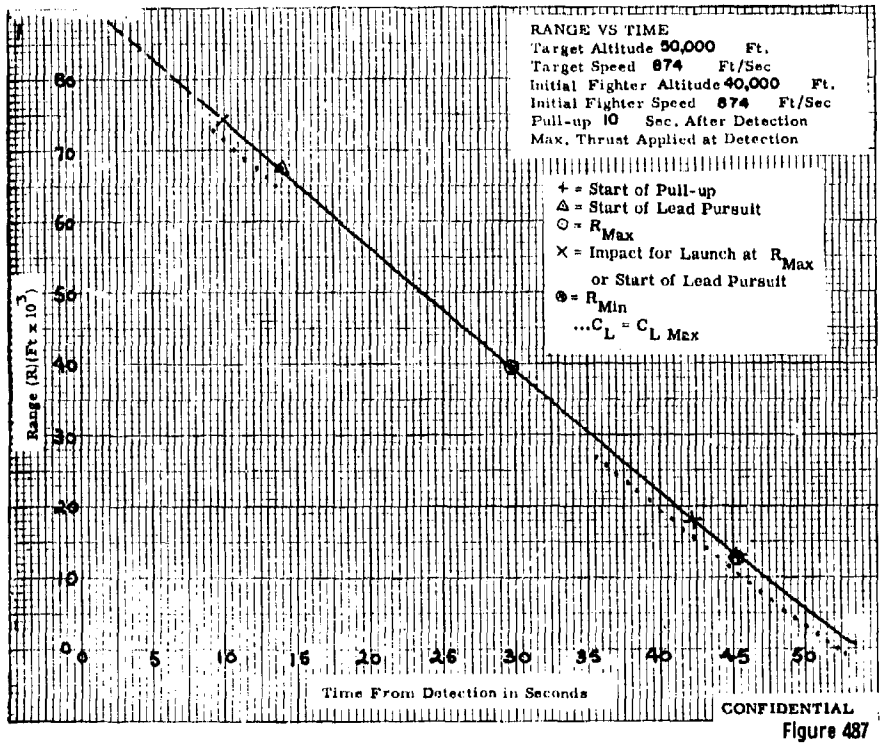
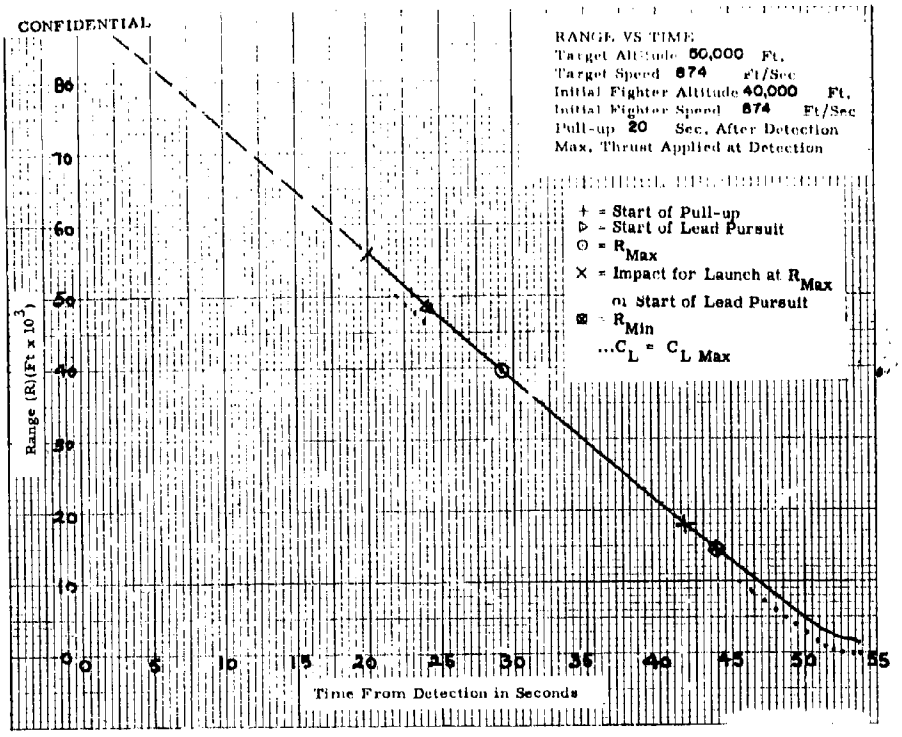

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
○ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
● = R Min
...C L = C L Max
Range (R)(Ft x 10³)
0
10
20
30
40
50
60
70
80
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds

Figure 487


RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊠ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds

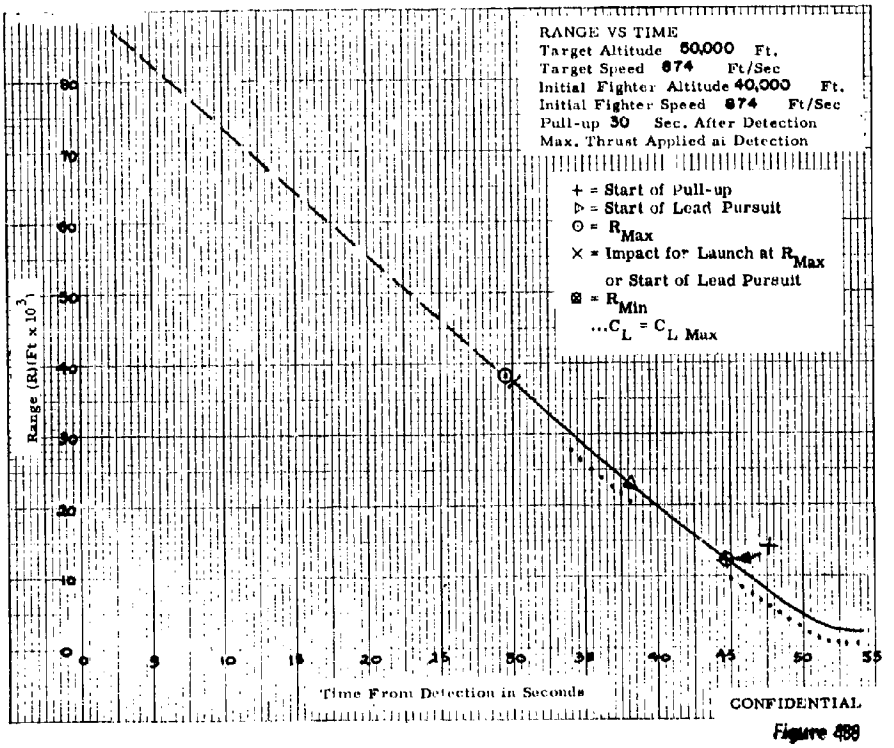
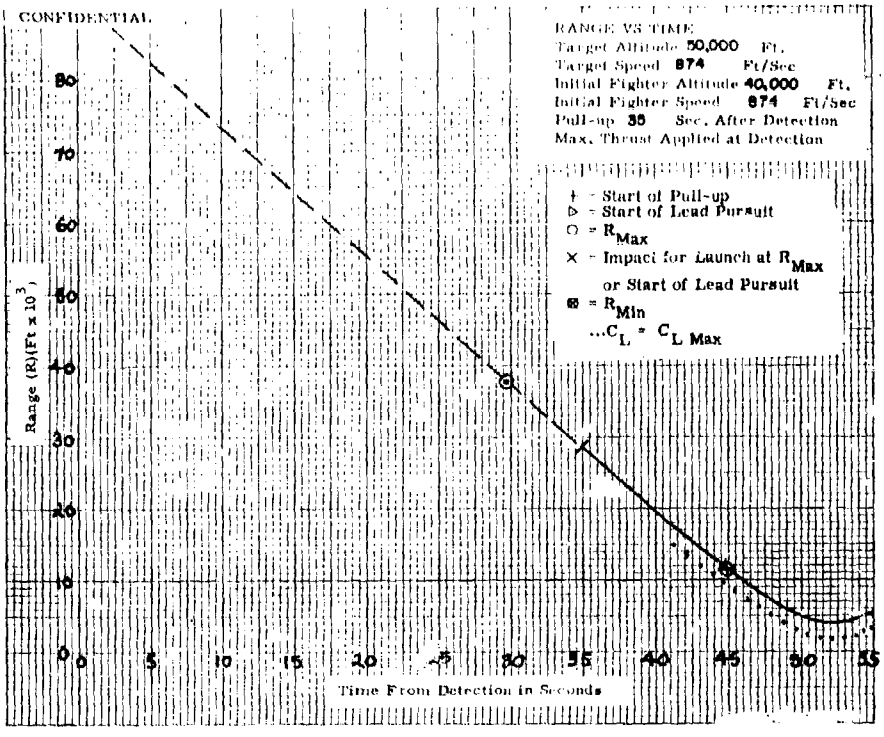

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊠ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
Time From Detection in Seconds

Figure 488


RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
80
70
60
50
40
30
20
10
0
0 5 10 15 20 25 30 35 40 45 50 55
Time From Detection in Seconds

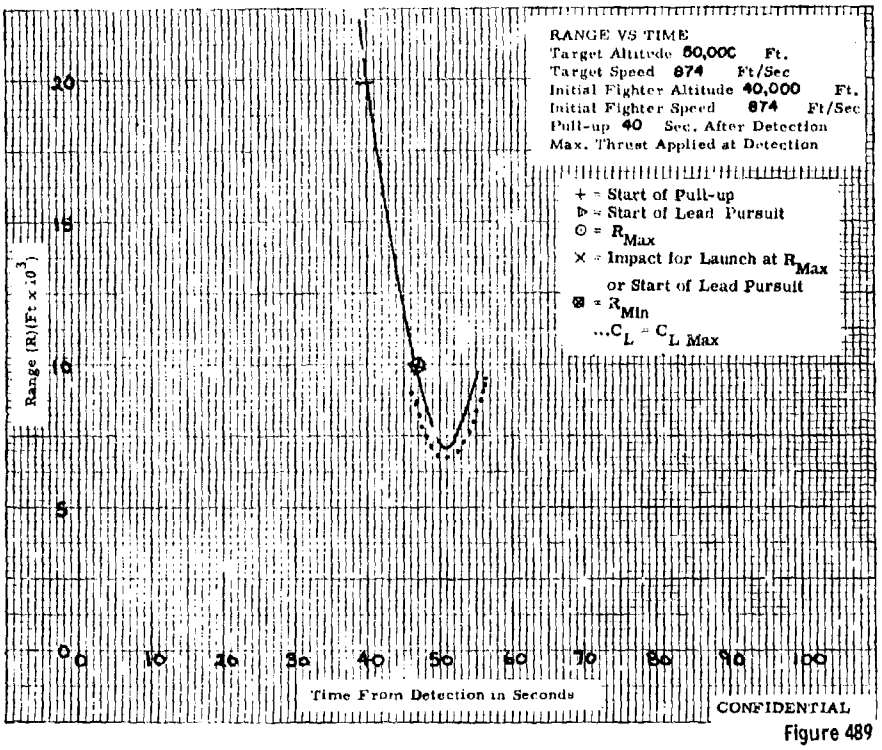

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 40 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
20
15
10
5
0
0 10 20 30 40 50 60 70 80 90 100
Time From Detection in Seconds

Figure 489

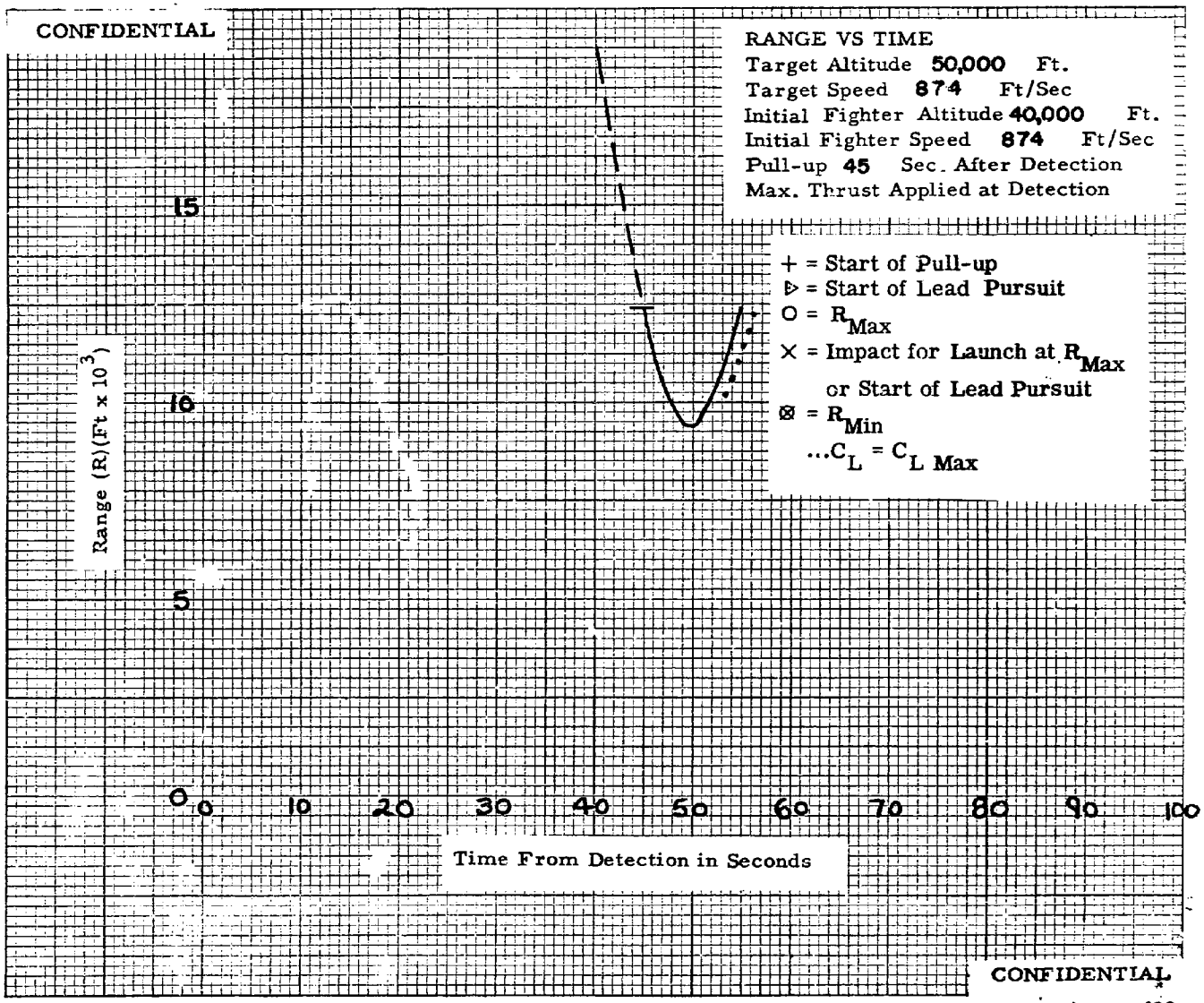
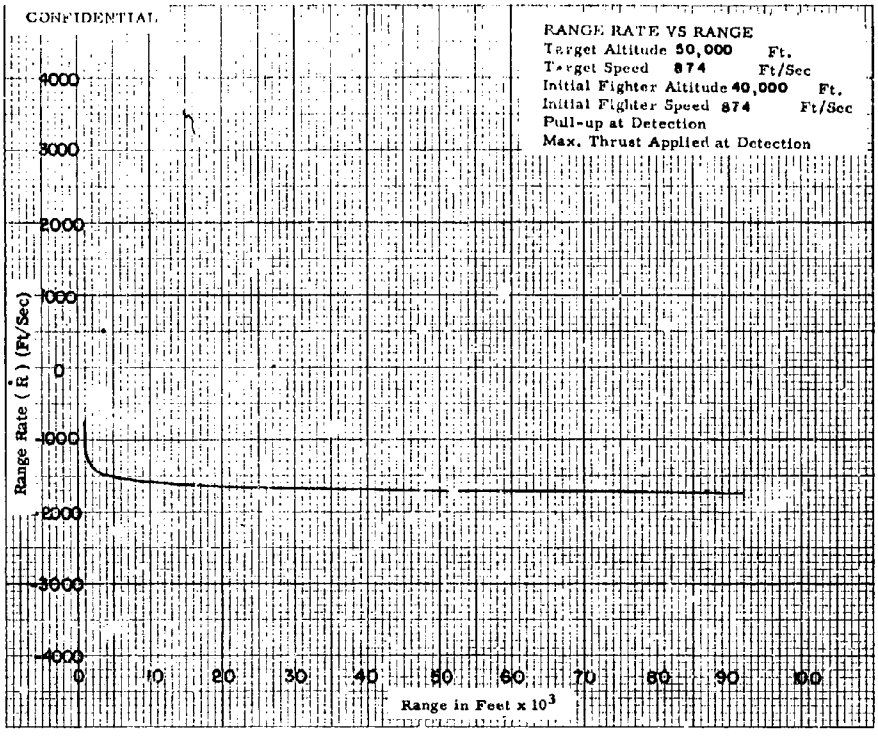

CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 45 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R_{Max}
× = Impact for Launch at R_{Max}
or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Time From Detection in Seconds
CONFIDENTIAL

Figure 490


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

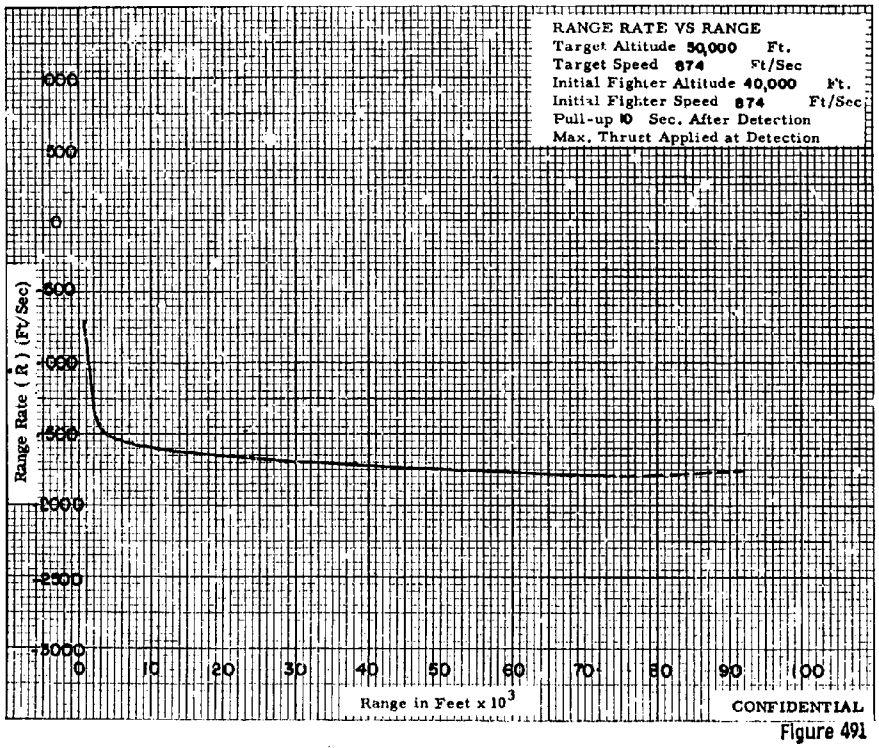
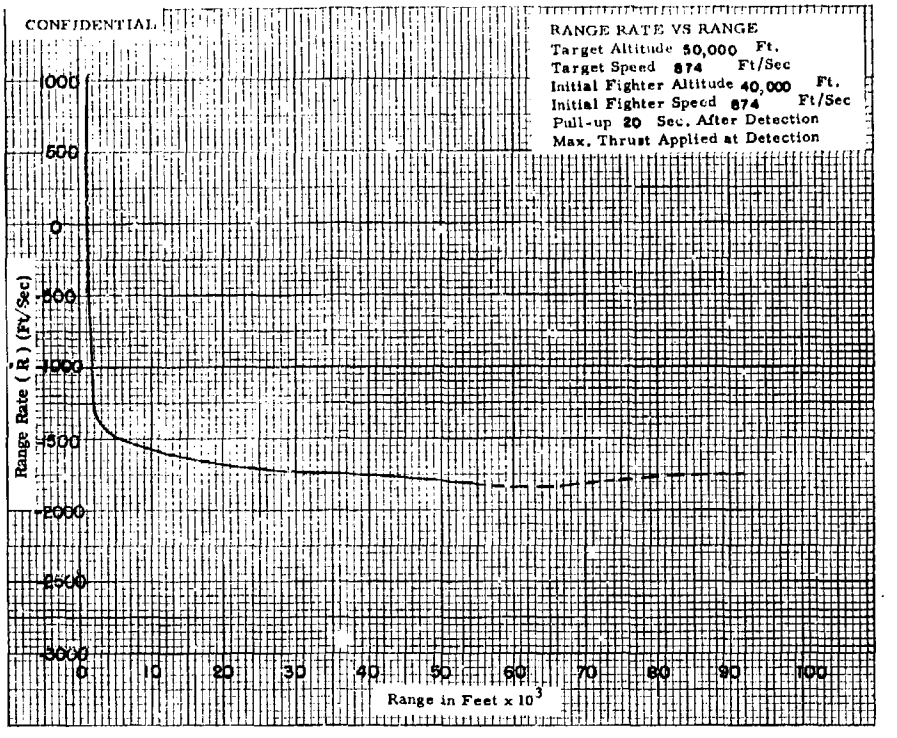

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 491


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

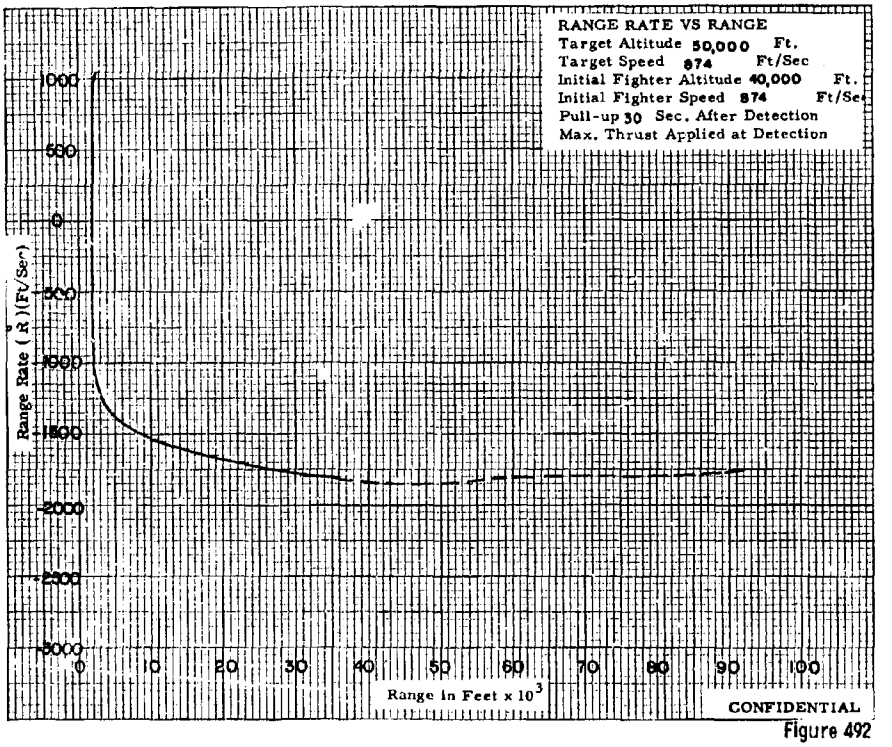
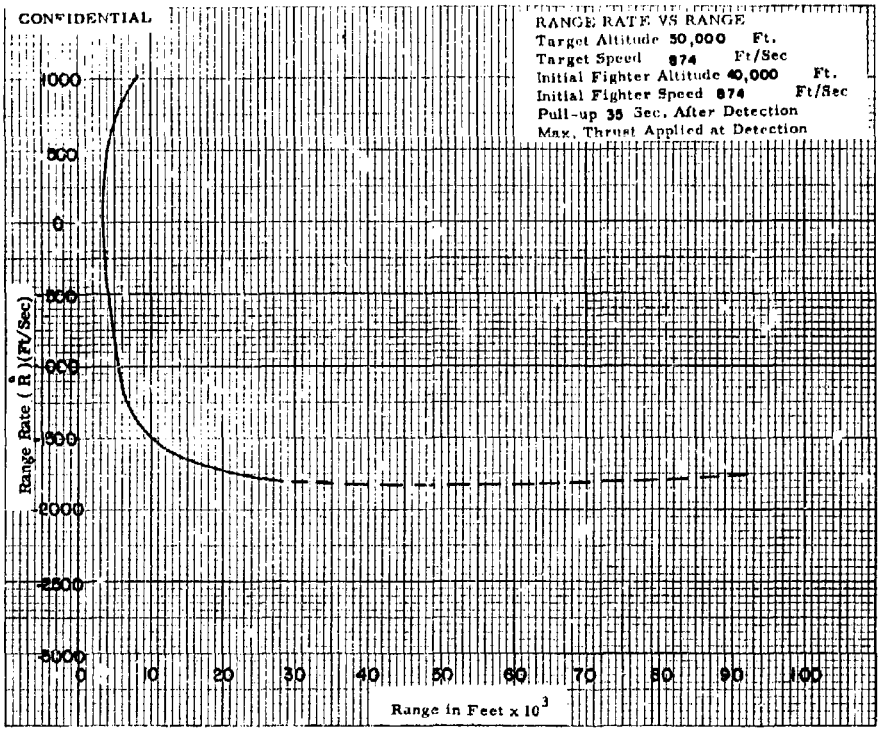

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 492


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

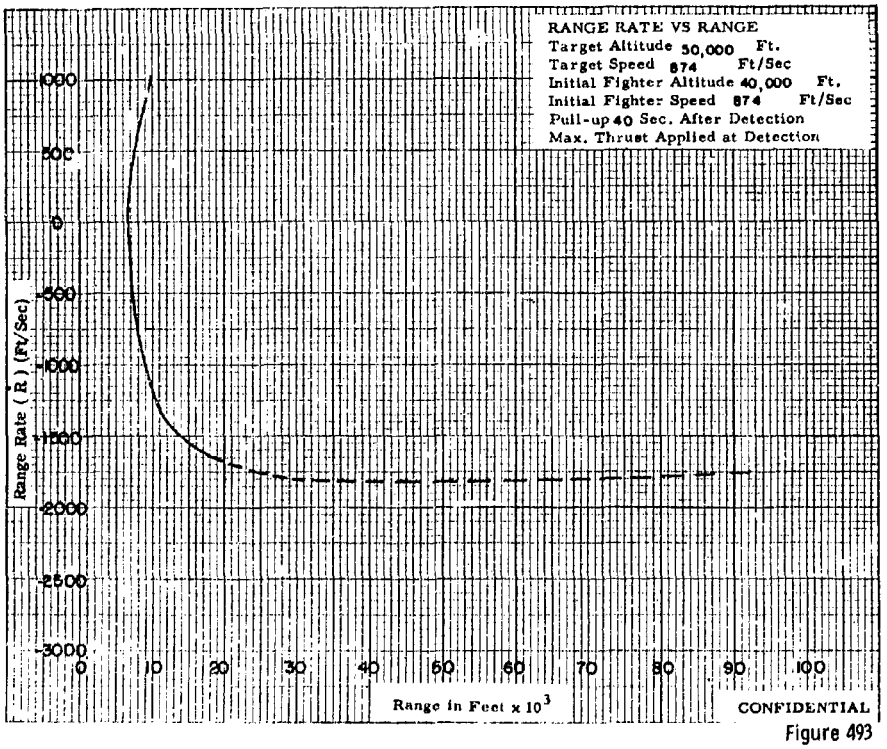
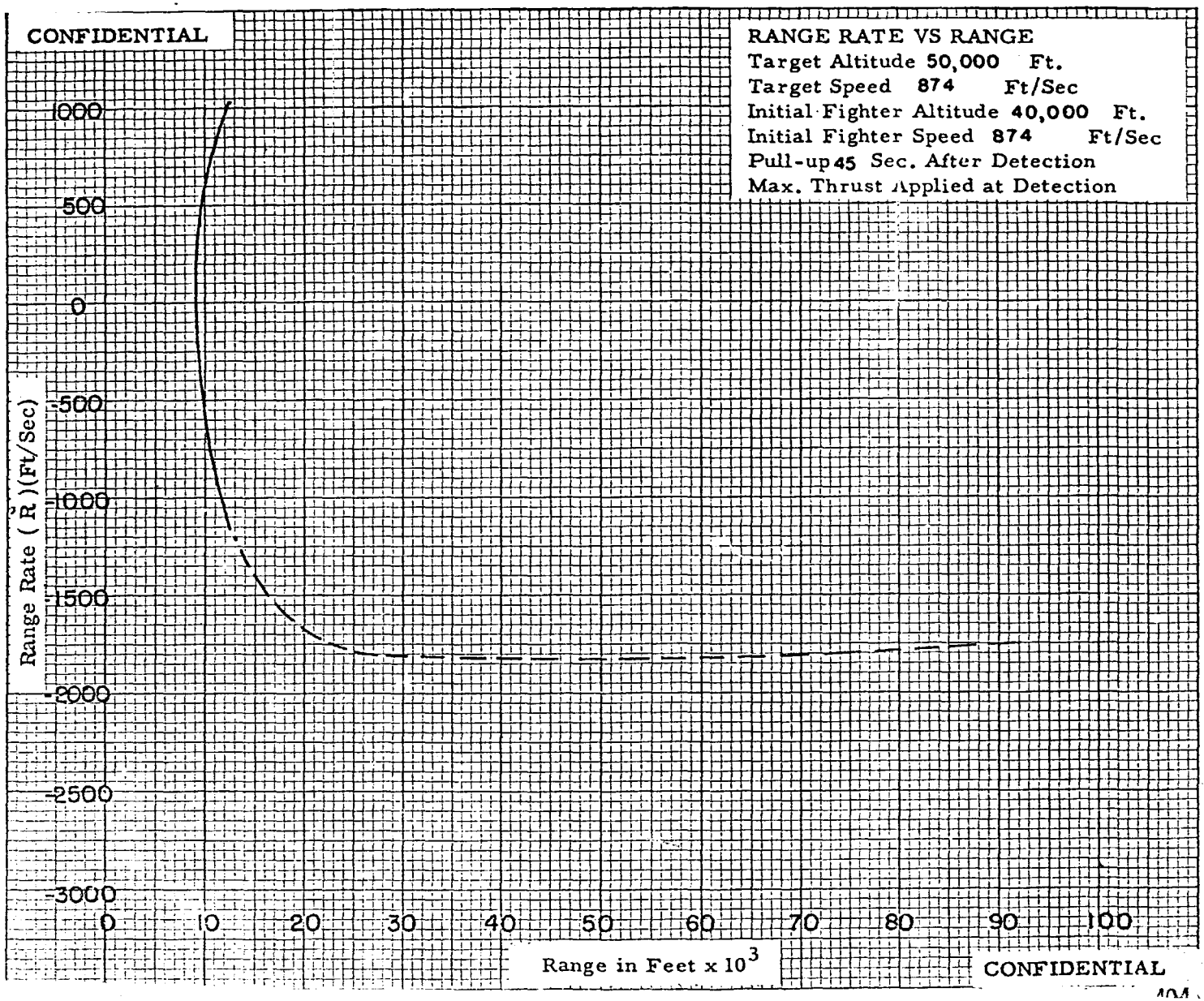
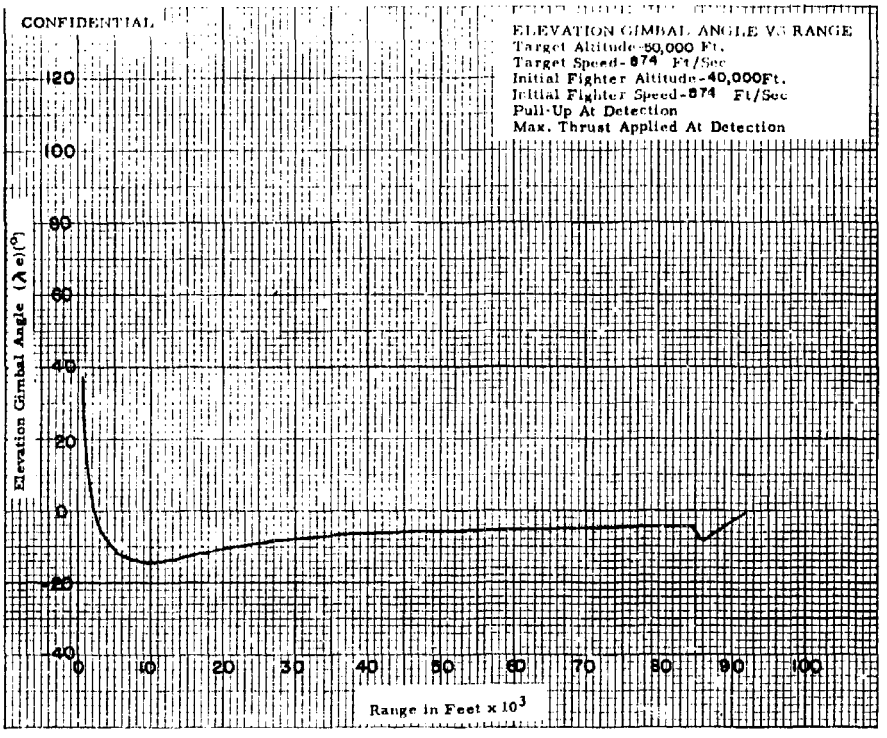

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 40 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 493


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 45 Sec. After Detection
Max. Thrust Applied at Detection
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
Range Rate (Ṙ) (Ft/Sec)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed-874 Ft/Sec
Initial Fighter Altitude-40,000Ft.
Initial Fighter Speed-874 Ft/Sec
Pull-Up At Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
120
100
80
60
40
20
0
-20
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

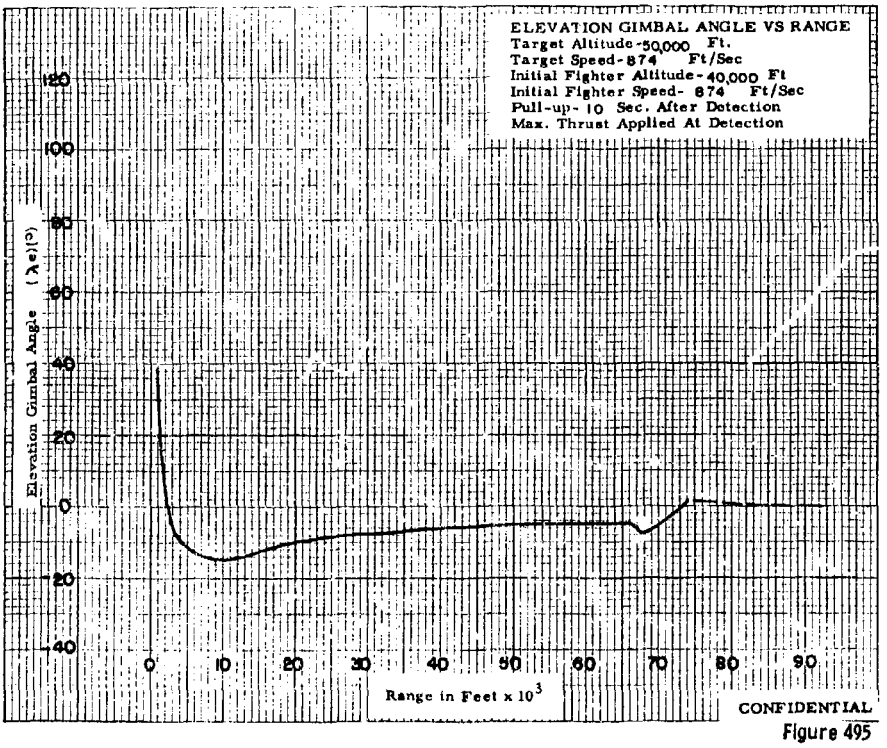
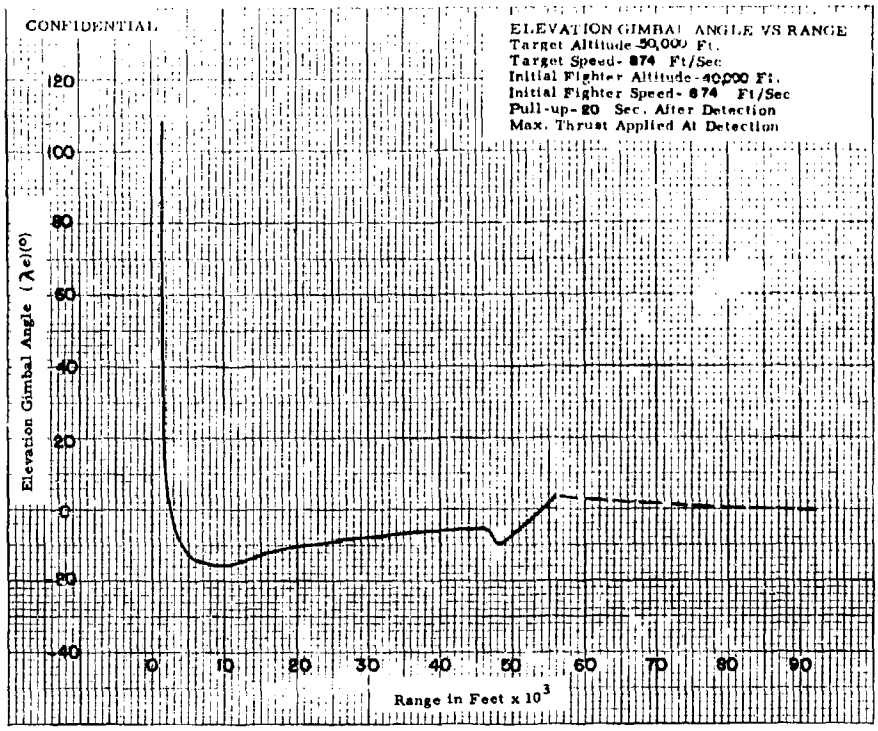

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed-874 Ft/Sec
Initial Fighter Altitude-40,000 Ft
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
120
100
80
60
40
20
0
-20
-40
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10³

Figure 495


CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
120
100
80
60
40
20
0
-20
-40
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10³

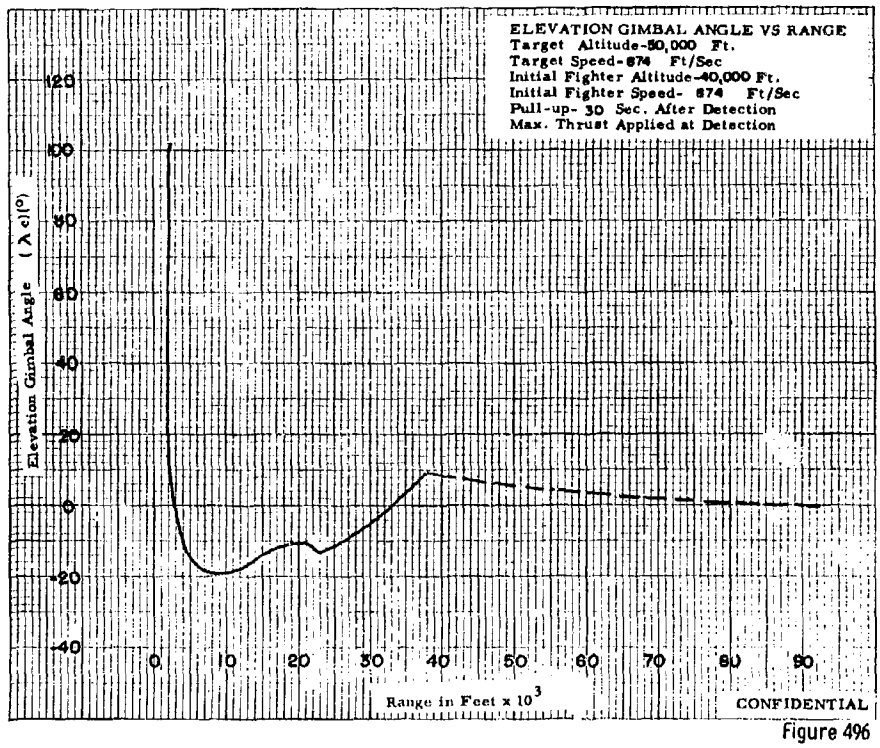
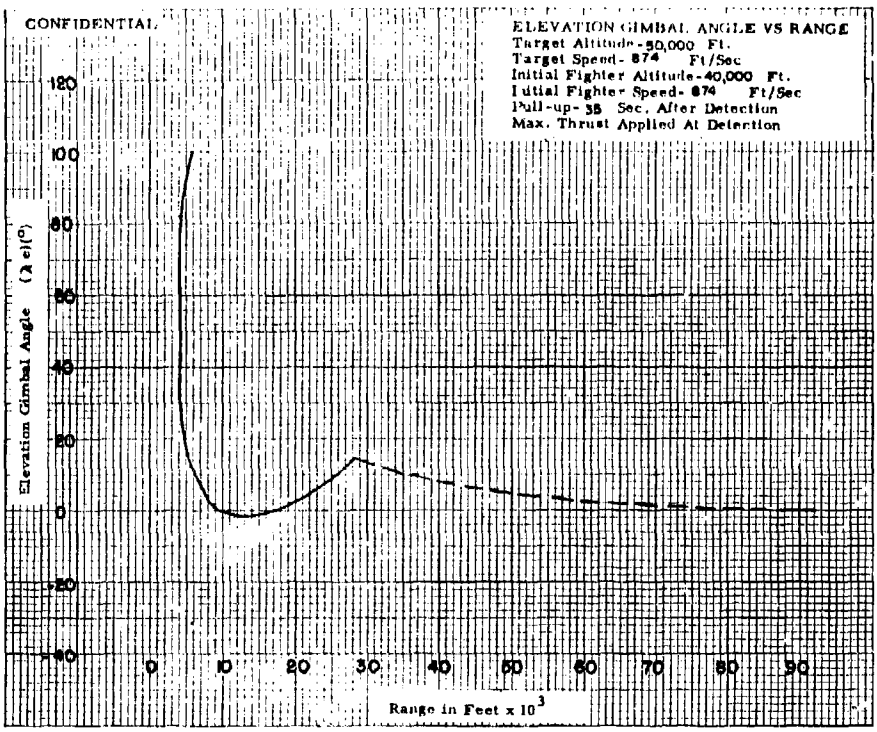

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed-874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 30 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Gimbal Angle (λe)(°)
120
100
80
60
40
20
0
-20
-40
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10³
CONFIDENTIAL

Figure 496


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 35 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
120
100
80
60
40
20
0
-20
-40
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3

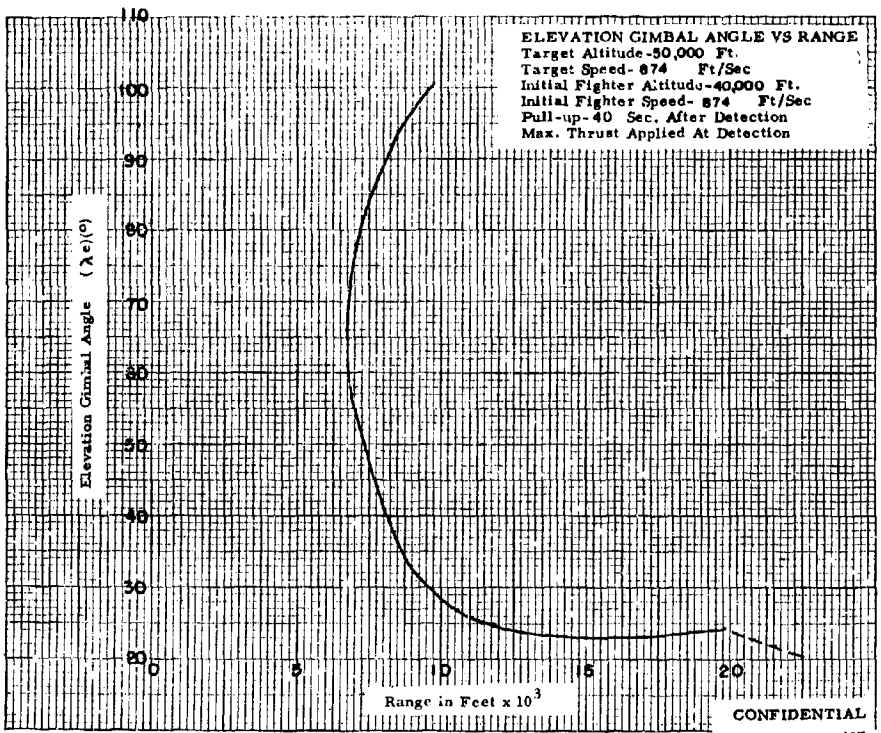

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 40 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
110
100
90
80
70
60
50
40
30
20
0
5
10
15
20
Range in Feet x 10^3
CONFIDENTIAL

Figure 497

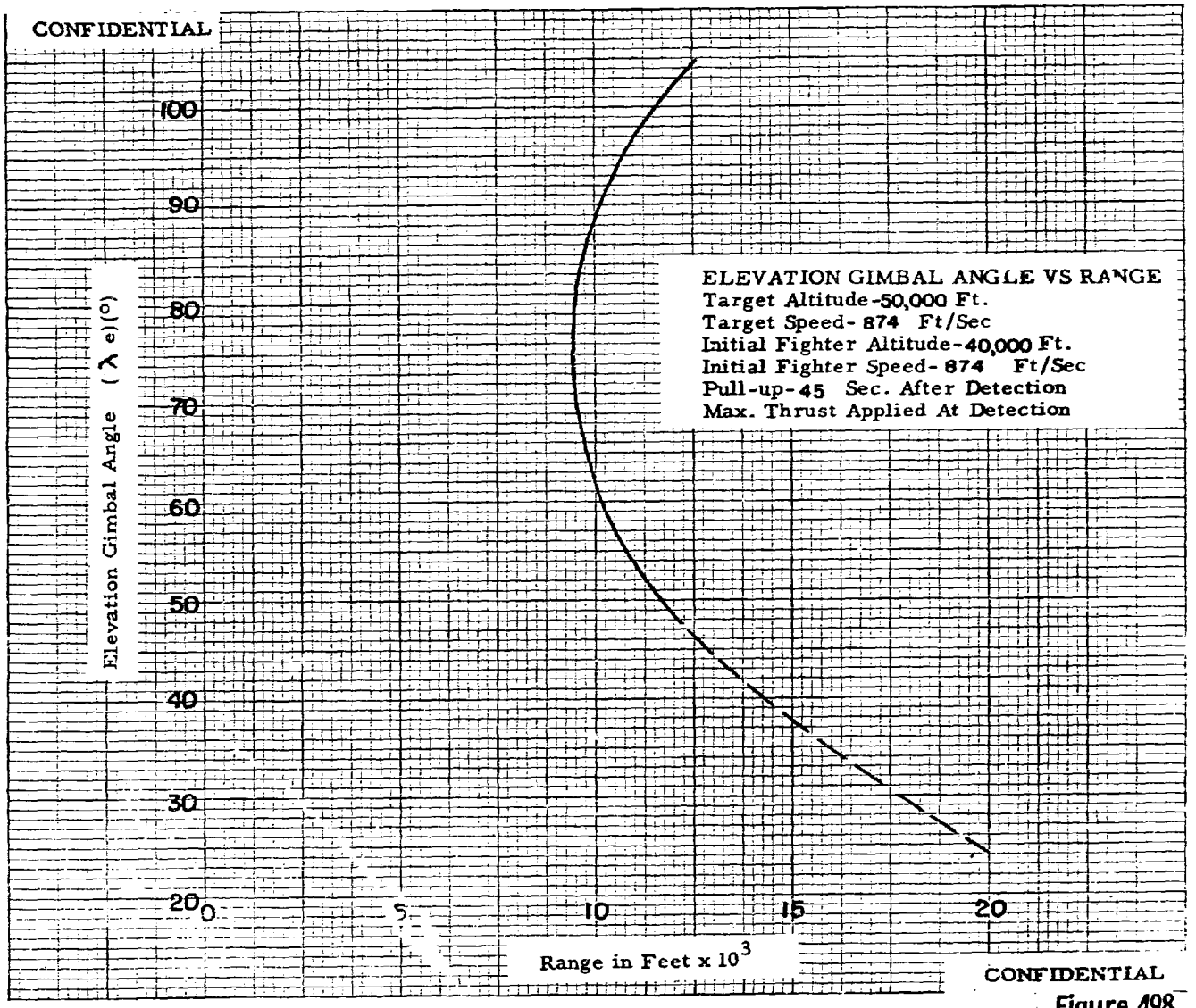
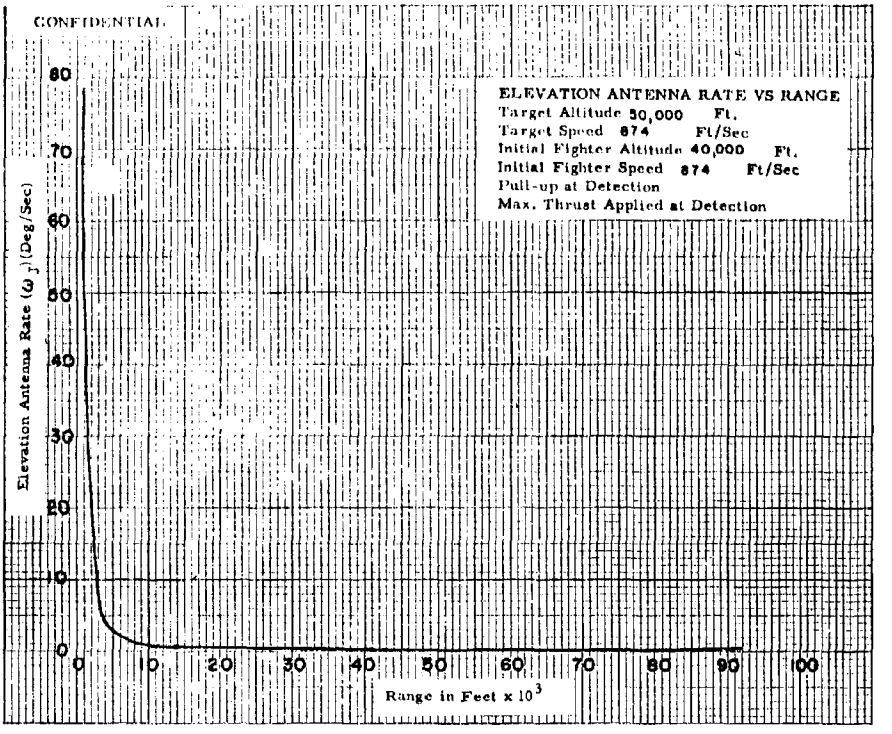

CONFIDENTIAL
100
90
80
70
60
50
40
30
20
0
5
10
15
20
Elevation Gimbal Angle (λ e)(°)
Range in Feet x 10^3
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 45 Sec. After Detection
Max. Thrust Applied At Detection
CONFIDENTIAL

Figure 498


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_y) (Deg/Sec)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

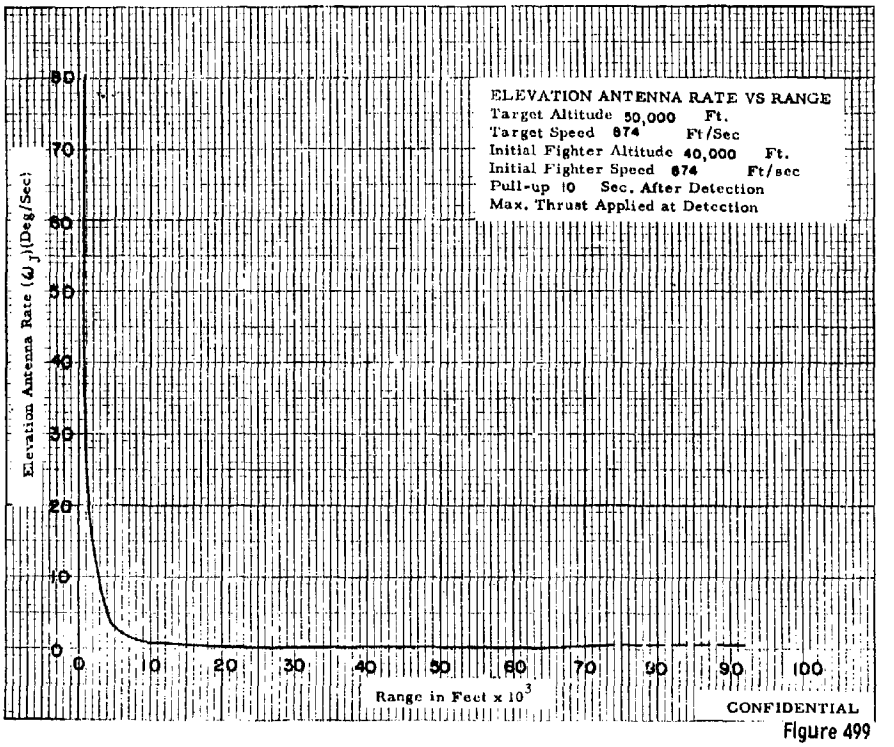
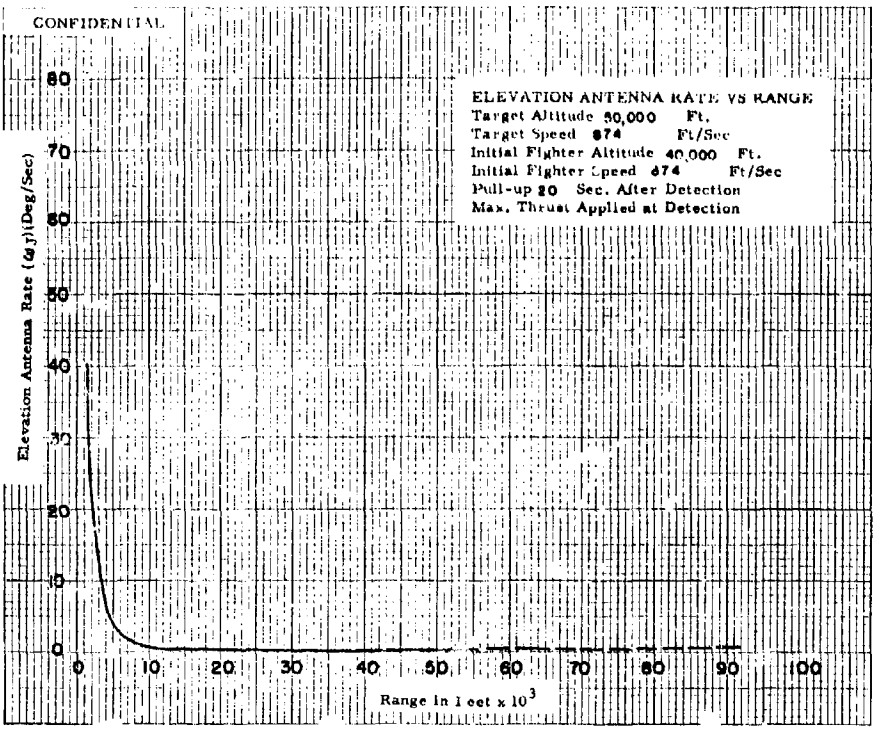

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_y) (Deg/Sec)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 499


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_y)(Deg/Sec)
Range in Feet x 10^3

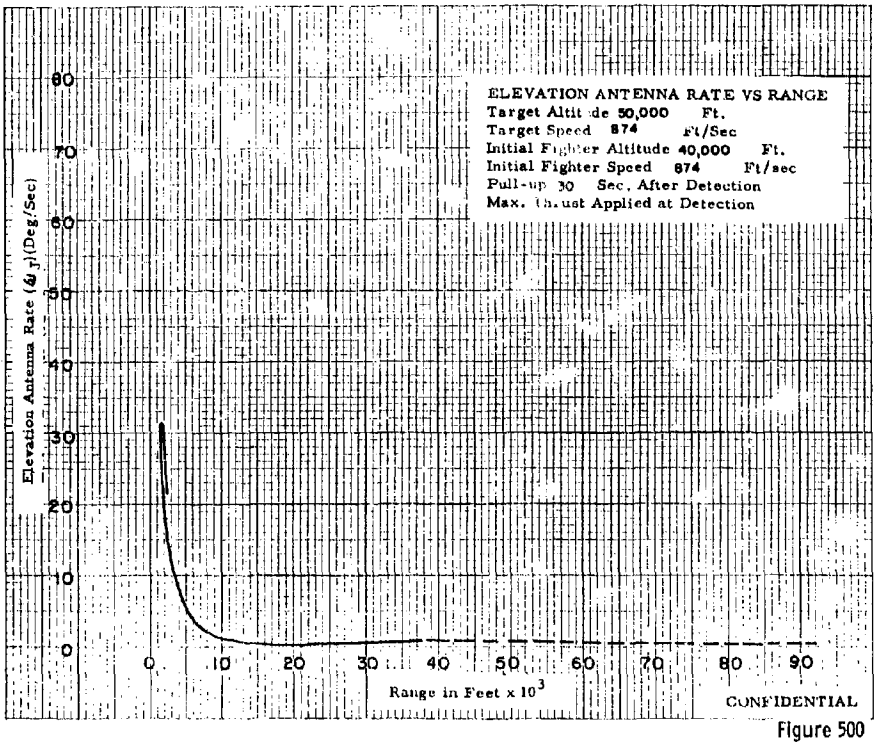
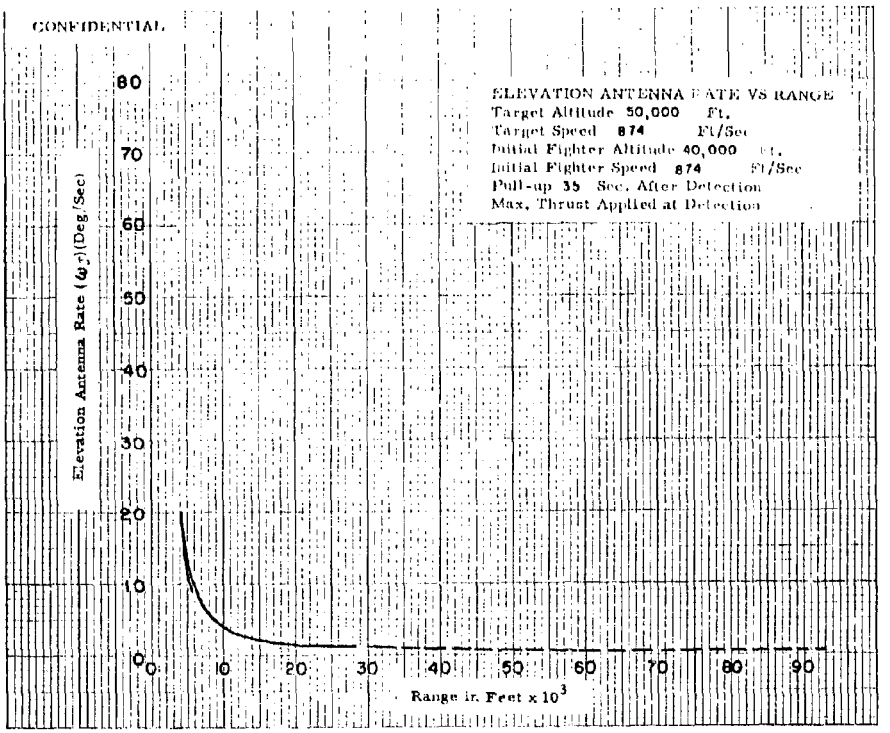

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_y)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 500


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ωy)(Deg/Sec)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3

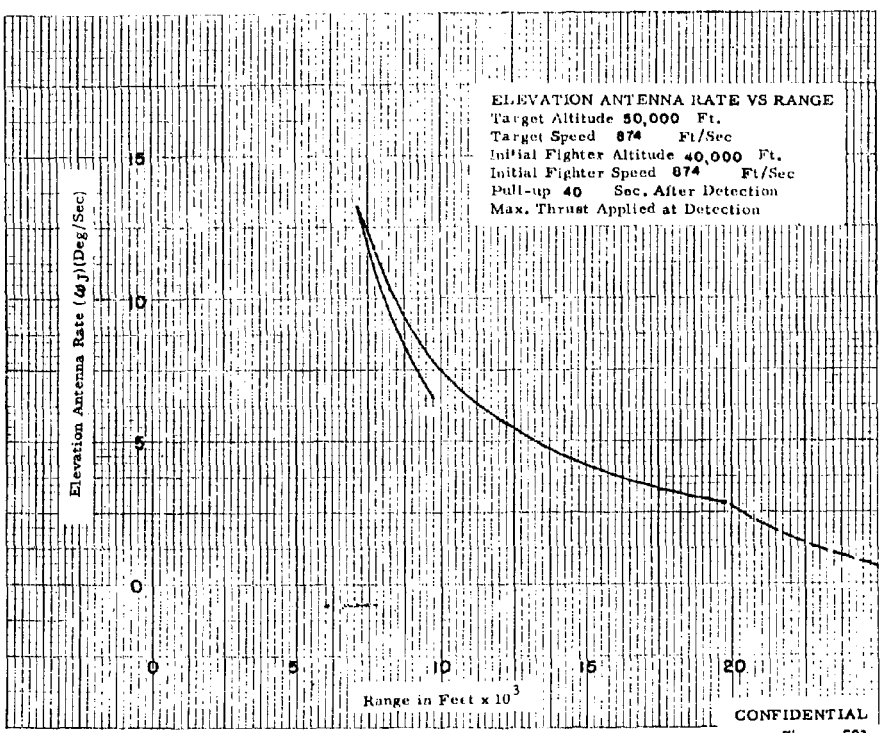

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 40 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ωy)(Deg/Sec)
15
10
5
0
0
5
10
15
20
Range in Feet x 10^3

Figure 501

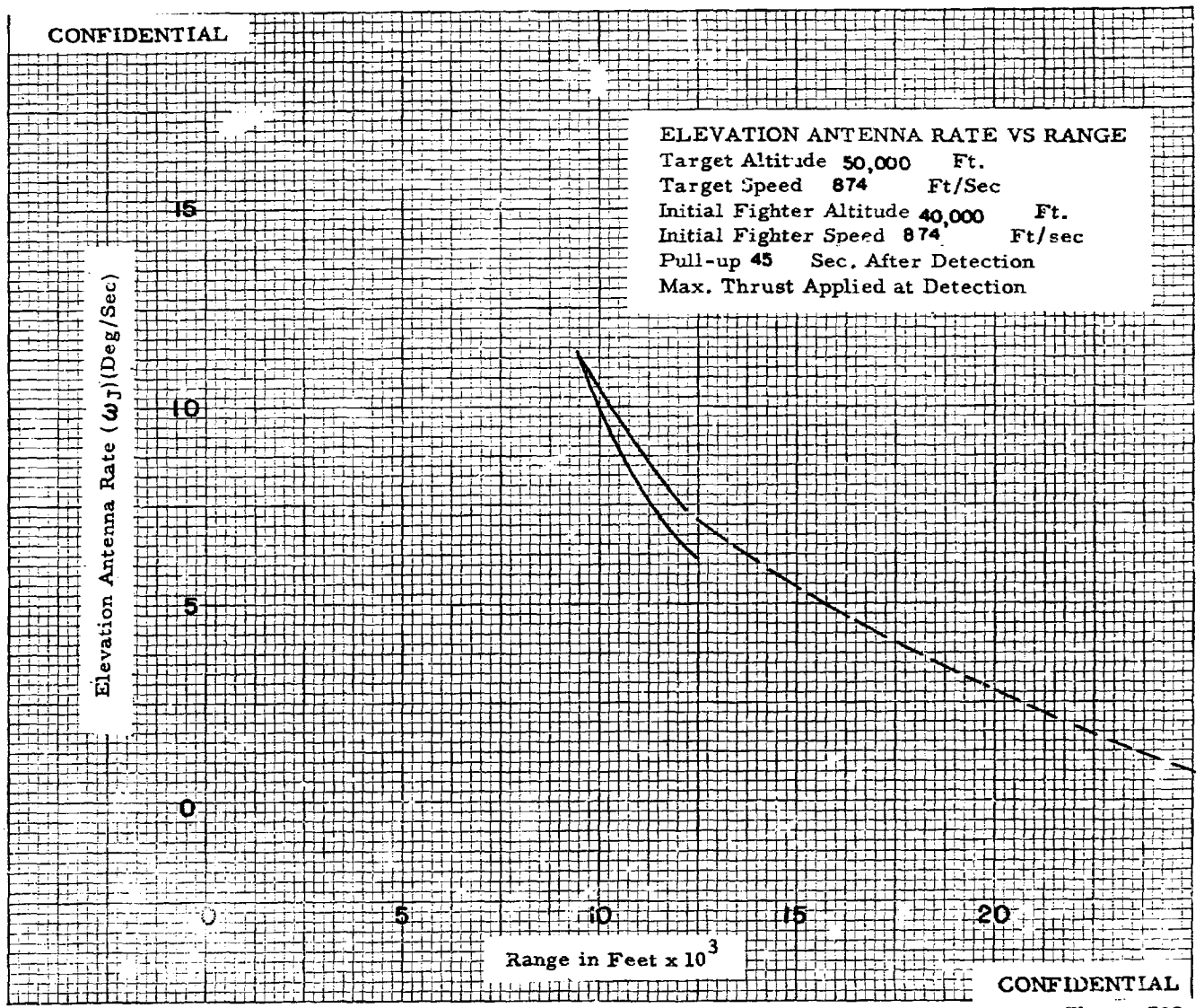
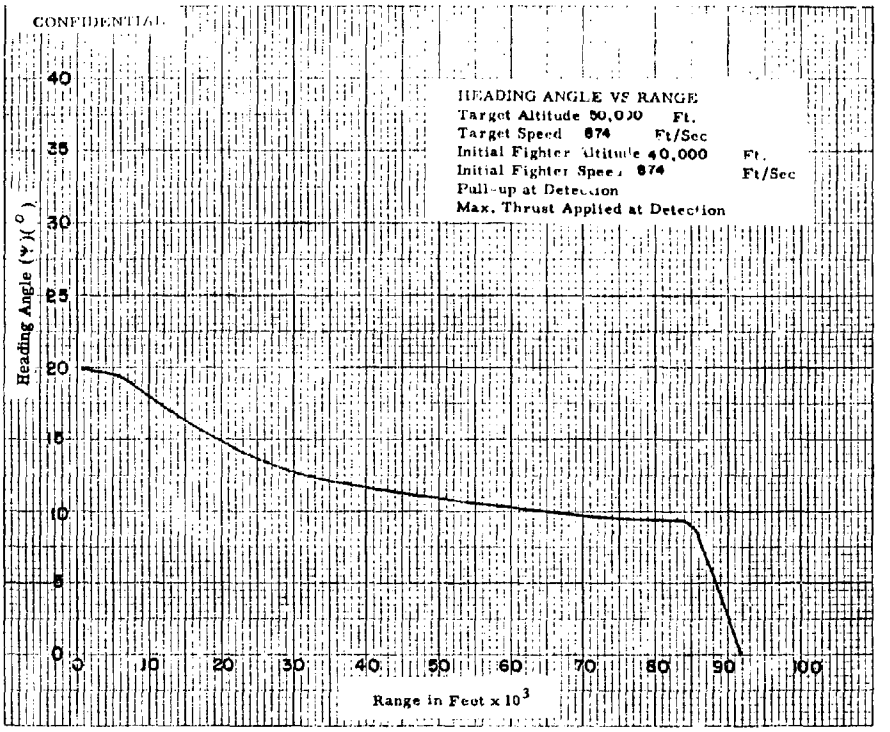

CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/sec
Pull-up 45 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_T)(Deg/Sec)
15
10
5
0
0
5
10
15
20
Range in Feet x 10^3
CONFIDENTIAL

Figure 502


HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Heading Angle (Ψ)(°)
Range in Feet x 10³
0
5
10
15
20
25
30
35
40
0
10
20
30
40
50
60
70
80
90
100

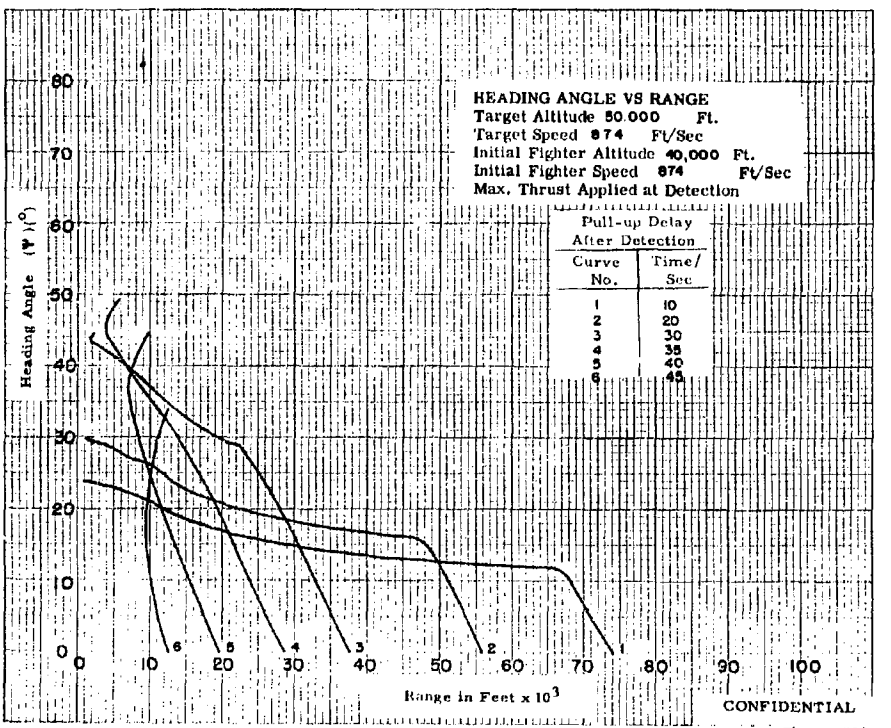
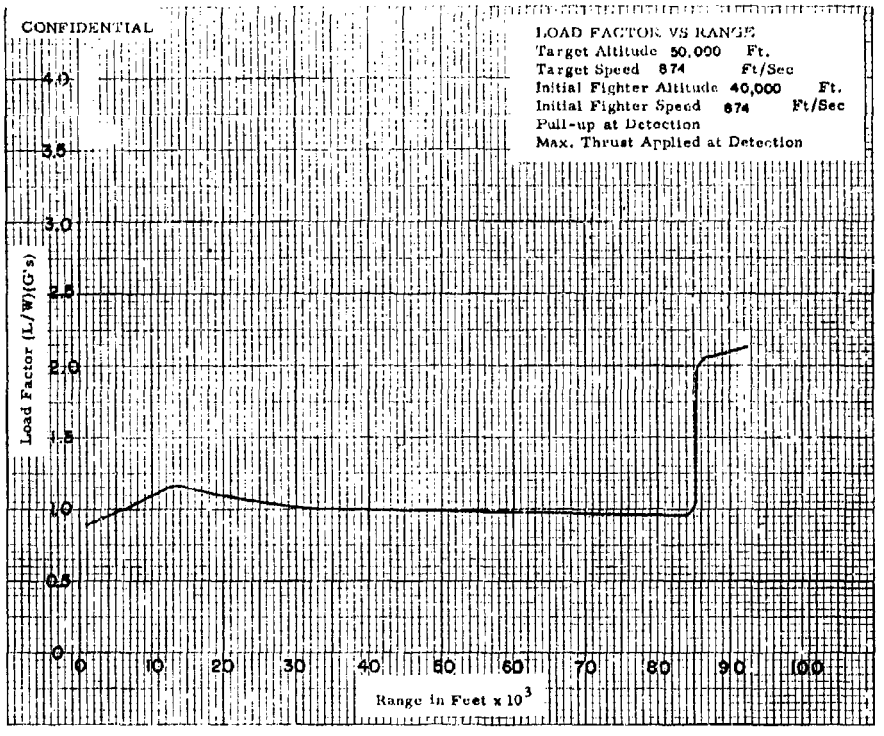

HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 10
2 | 20
3 | 30
4 | 35
5 | 40
6 | 45
Heading Angle (Ψ)(°)
Range in Feet x 10³
0
10
20
30
40
50
60
70
80
90
100
1
2
3
4
5
6

Figure 503


LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

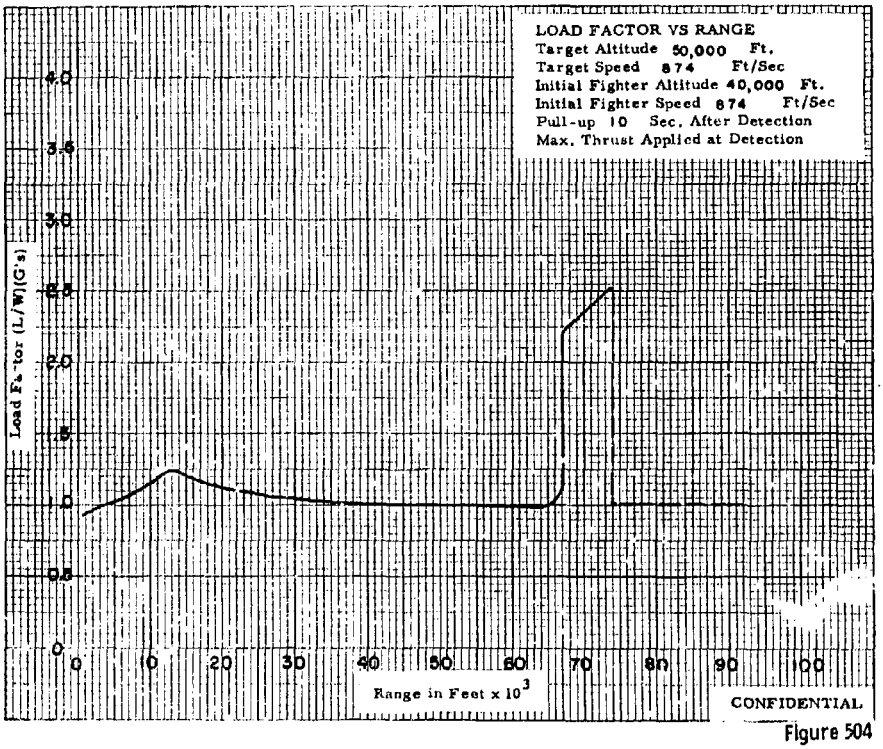
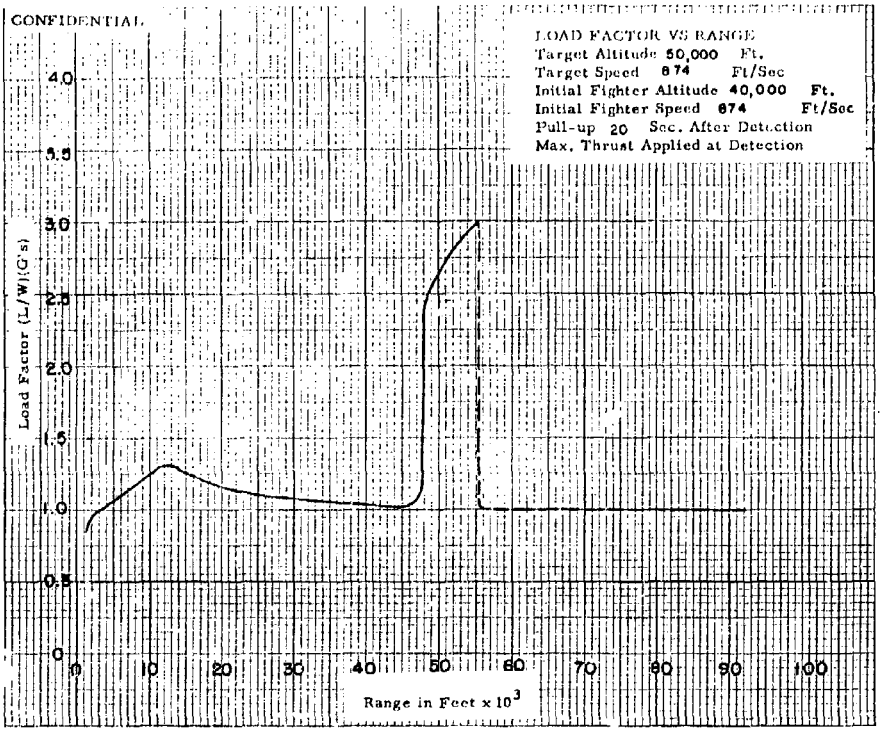

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

Figure 504


LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

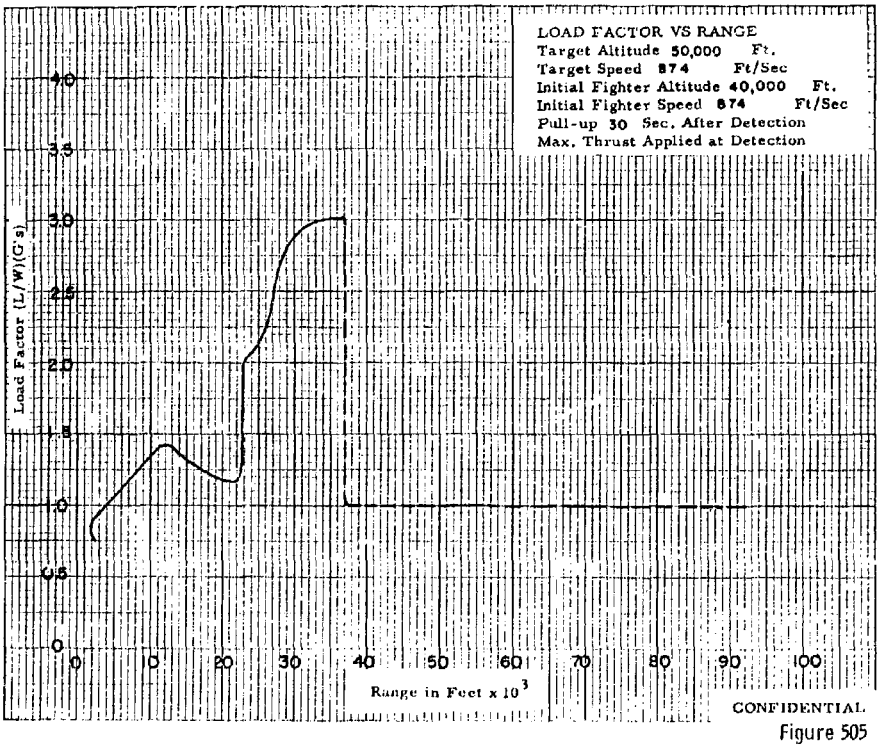
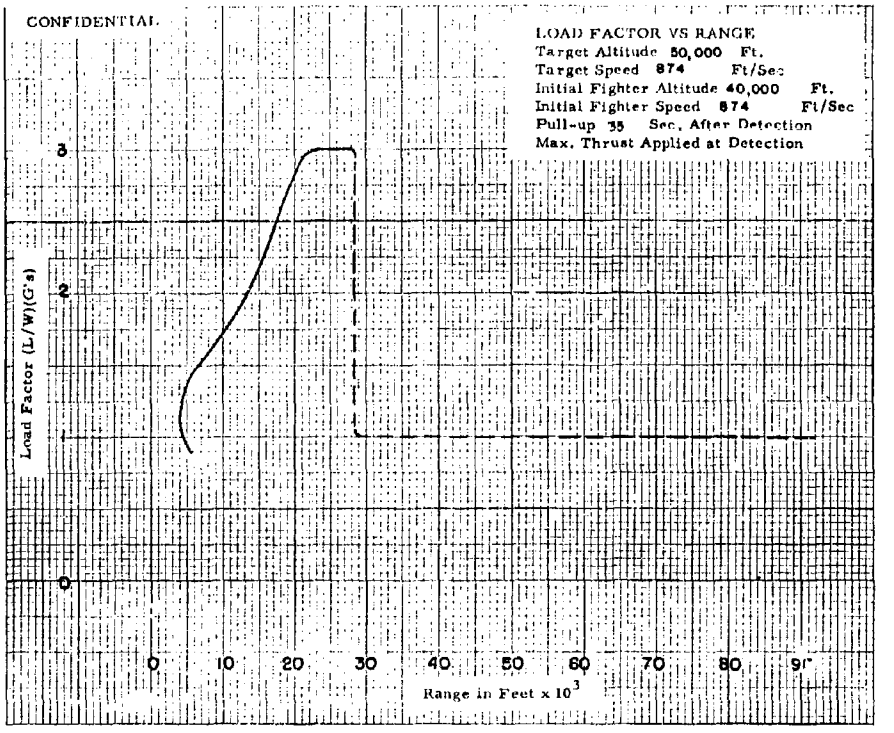

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 505


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
3
2
1
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3

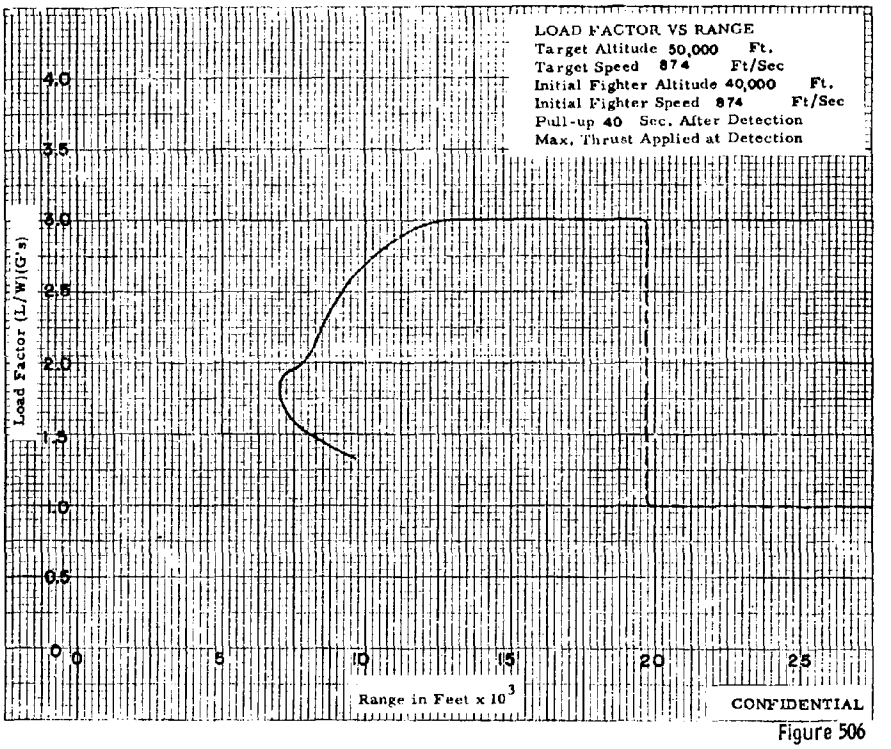

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 40 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
5
10
15
20
25
Range in Feet x 10^3
CONFIDENTIAL

Figure 506

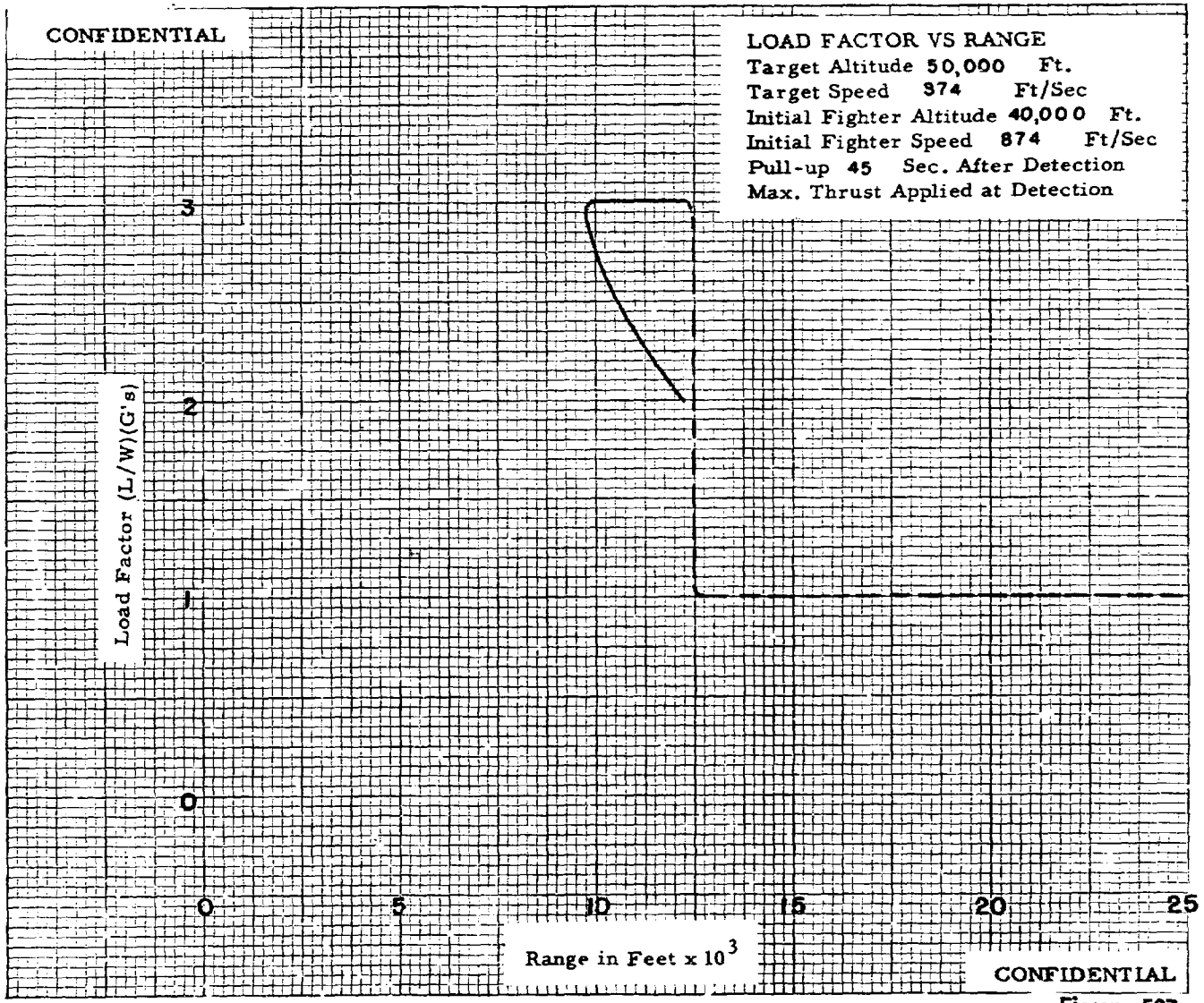
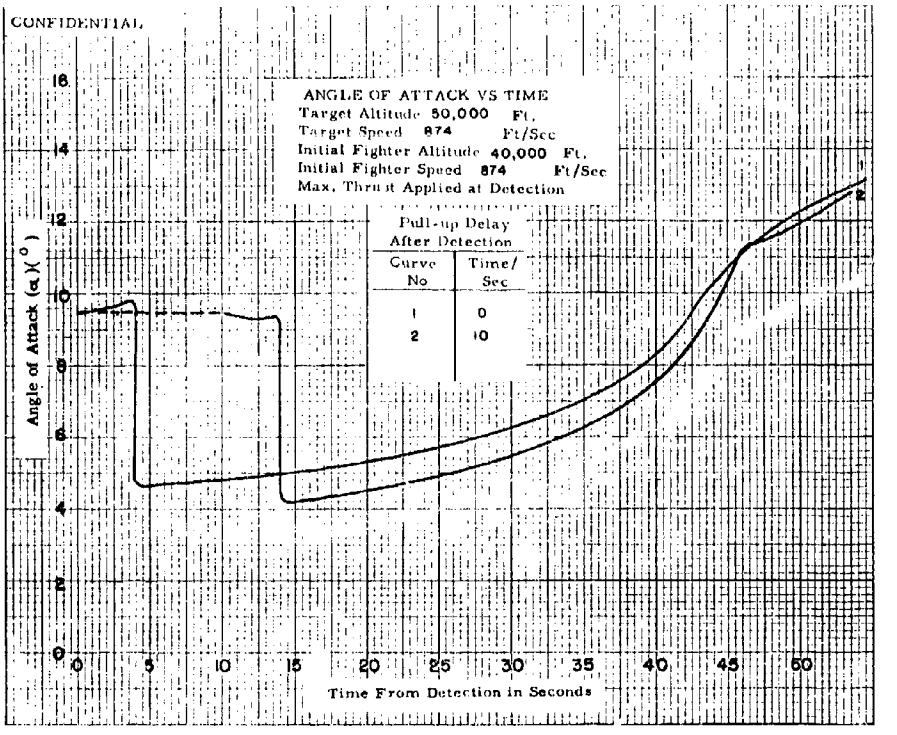
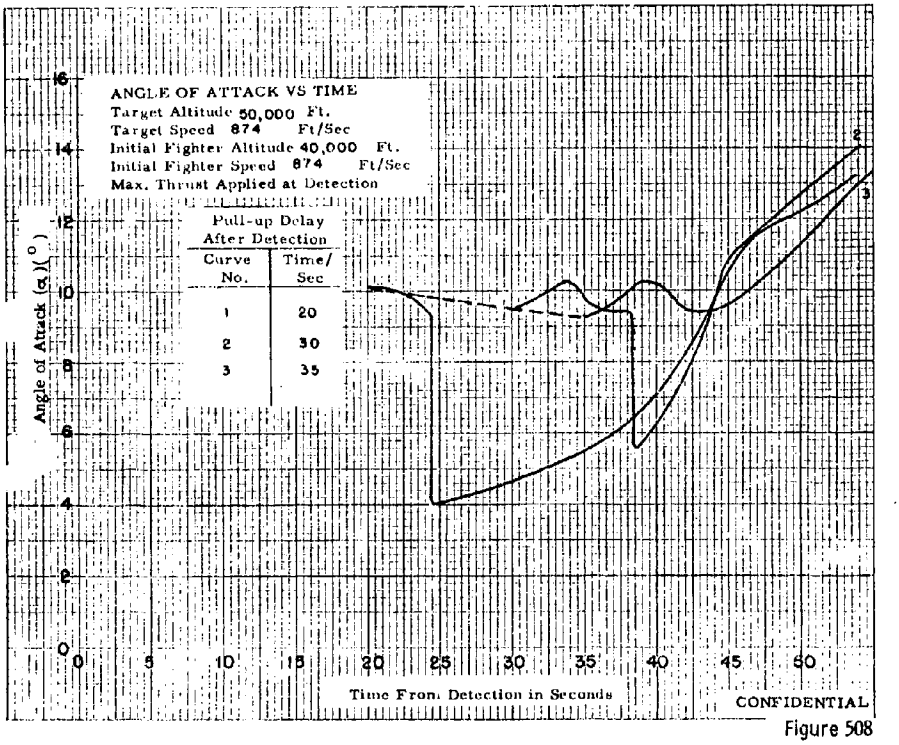

CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 374 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 45 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
3
2
1
0
0
5
10
15
20
25
Range in Feet x 10^3
CONFIDENTIAL

Figure 507

CONFIDENTIAL





CONFIDENTIAL

Figure 508

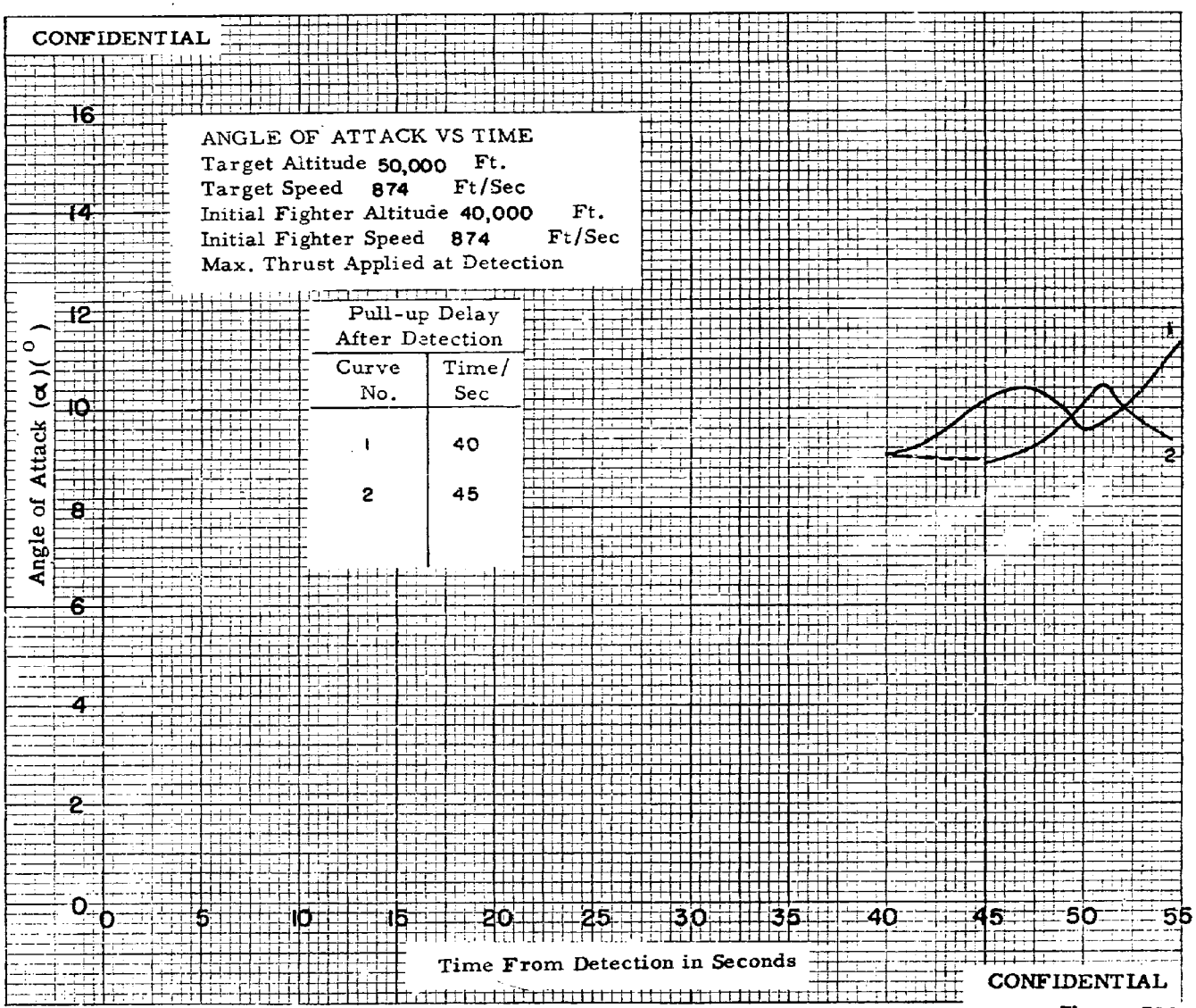
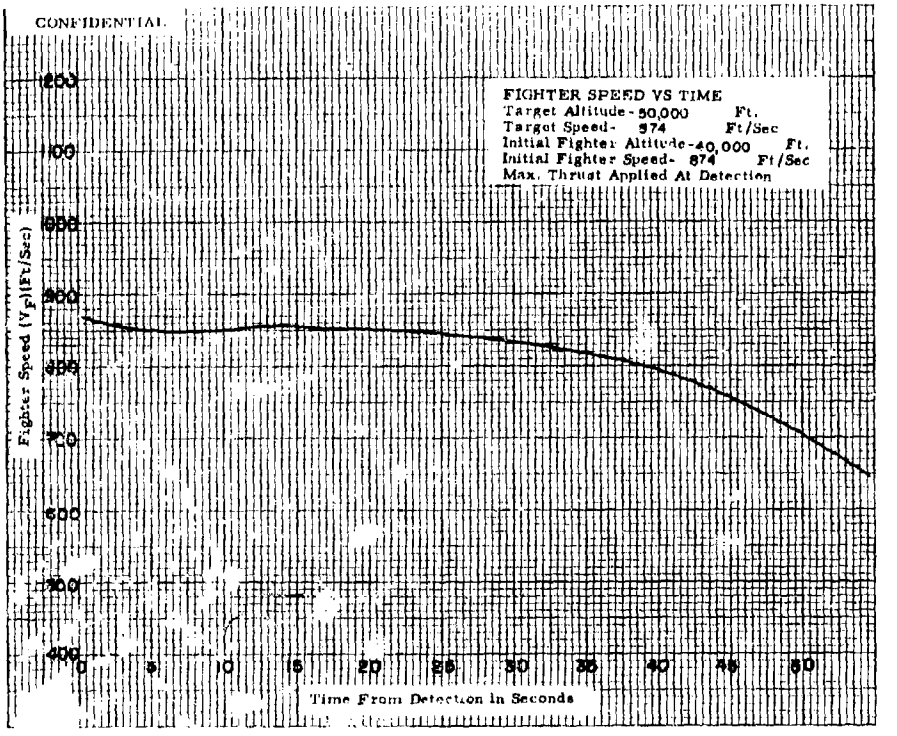

CONFIDENTIAL
ANGLE OF ATTACK VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 40
2 | 45
Angle of Attack (α)(°)
16
14
12
10
8
6
4
2
0
0 5 10 15 20 25 30 35 40 45 50 55
Time From Detection in Seconds
1
2
CONFIDENTIAL

Figure 509


FIGHTER SPEED VS TIME
Target Altitude- 50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Max. Thrust Applied At Detection
Fighter Speed (V_F)(Ft/Sec)
Time From Detection In Seconds

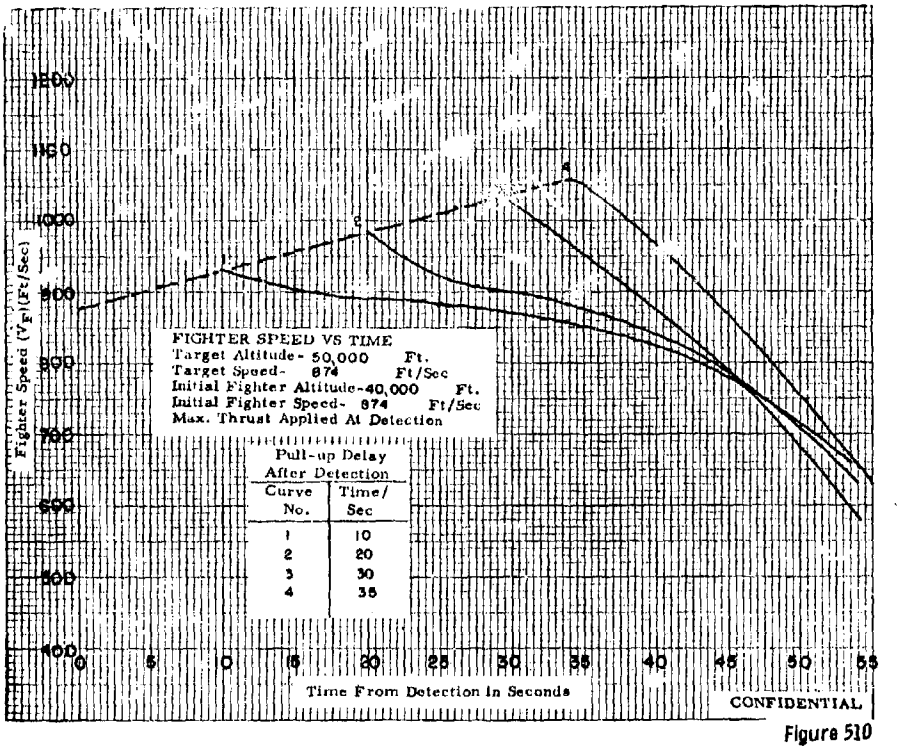
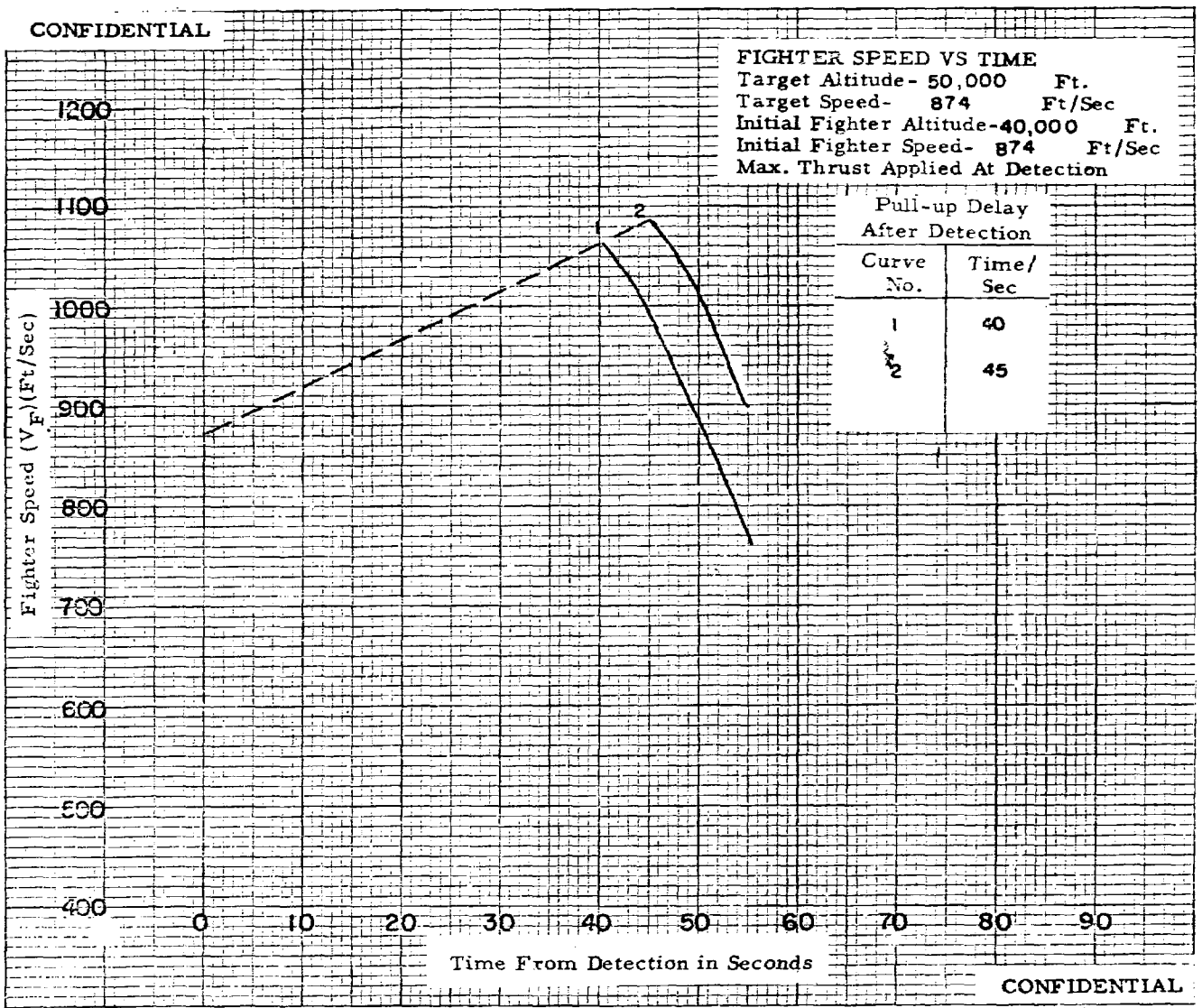

FIGHTER SPEED VS TIME
Target Altitude- 50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 10
2 | 20
3 | 30
4 | 35
Fighter Speed (V_F)(Ft/Sec)
Time From Detection In Seconds

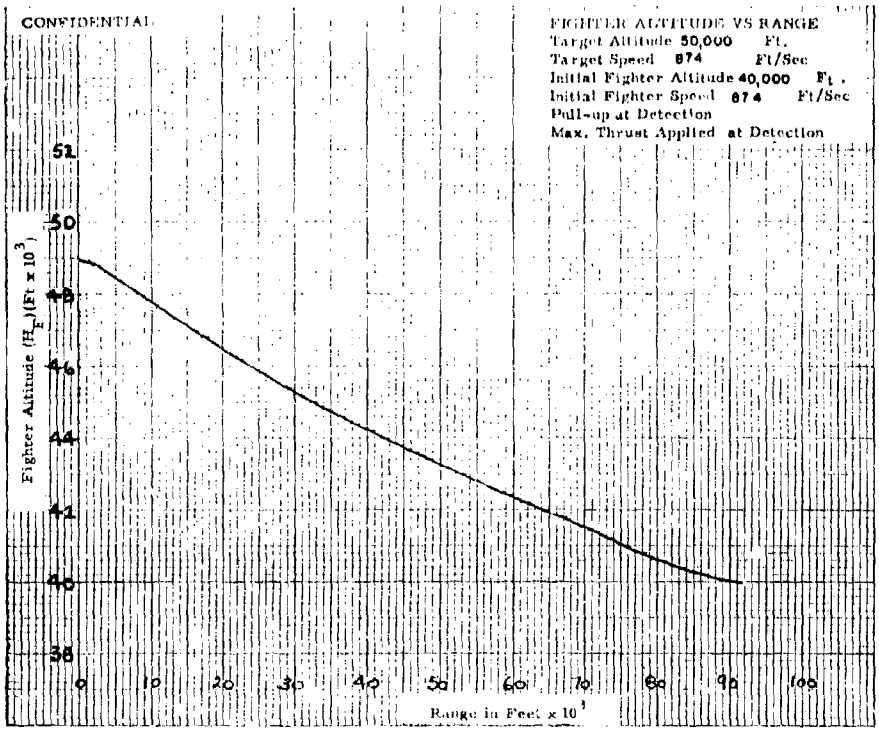
Figure 510

CONFIDENTIAL



CONFIDENTIAL

Figure 511


FIGHTER ALTITUDE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Fighter Altitude (H_F)(Ft x 10^3)
52
50
48
46
44
42
40
38
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

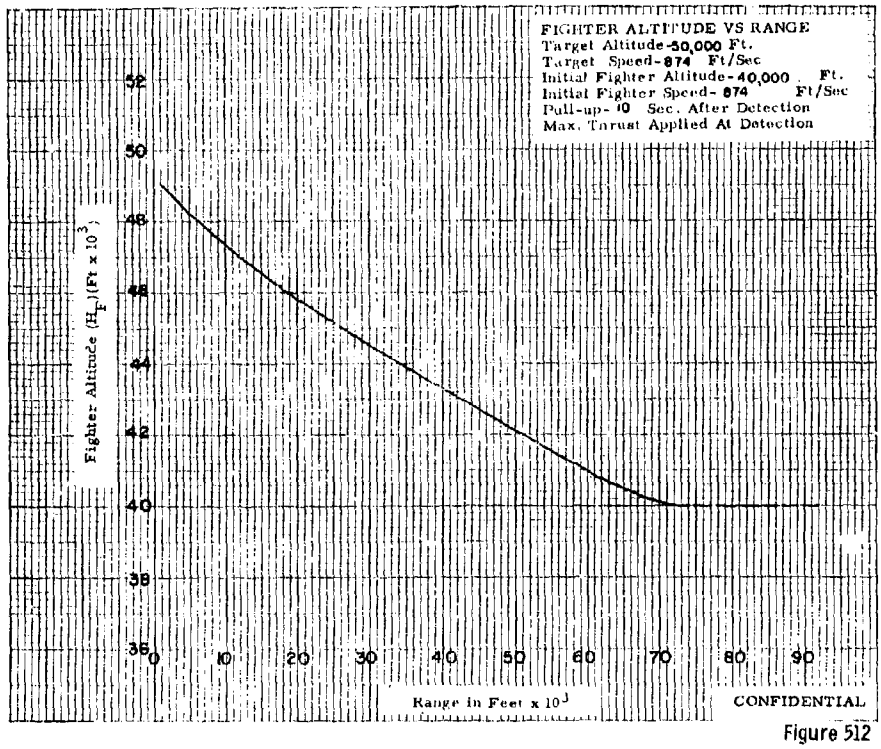
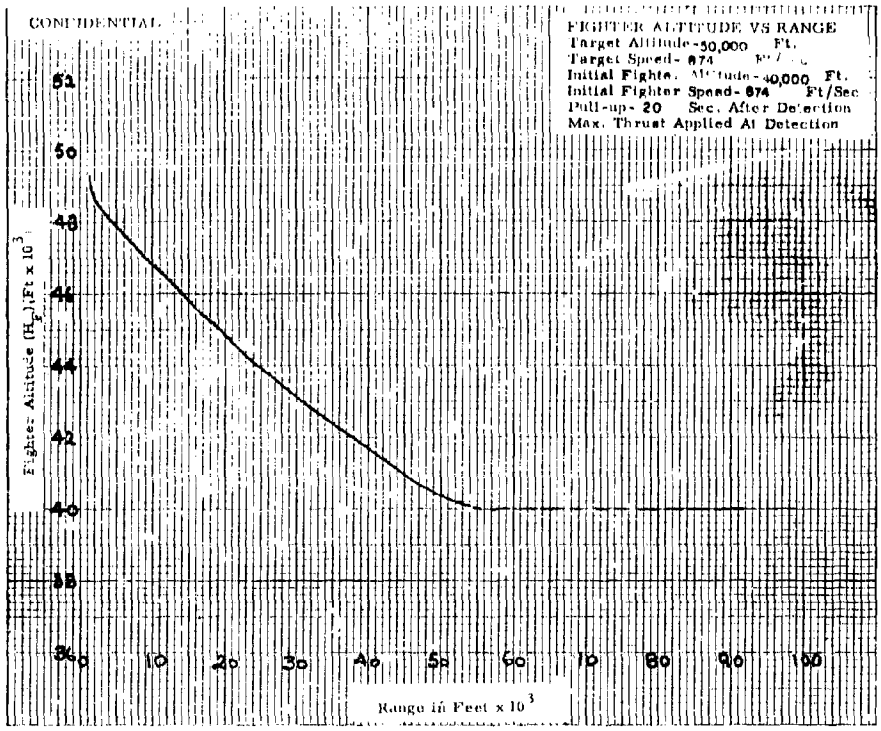

FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed-874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
52
50
48
46
44
42
40
38
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3

Figure 512


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
52
50
48
46
44
42
40
38
36
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

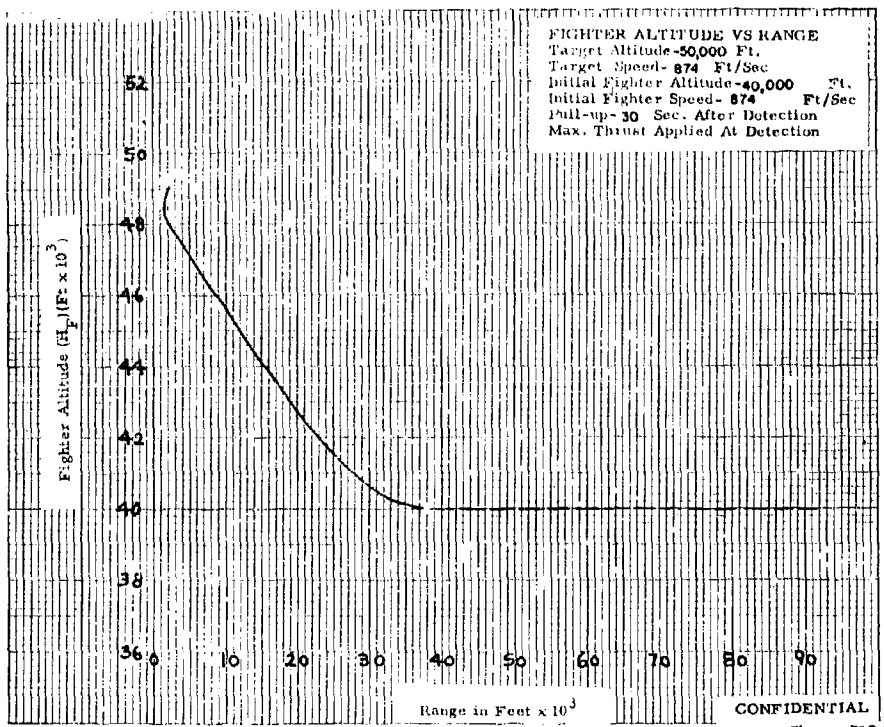
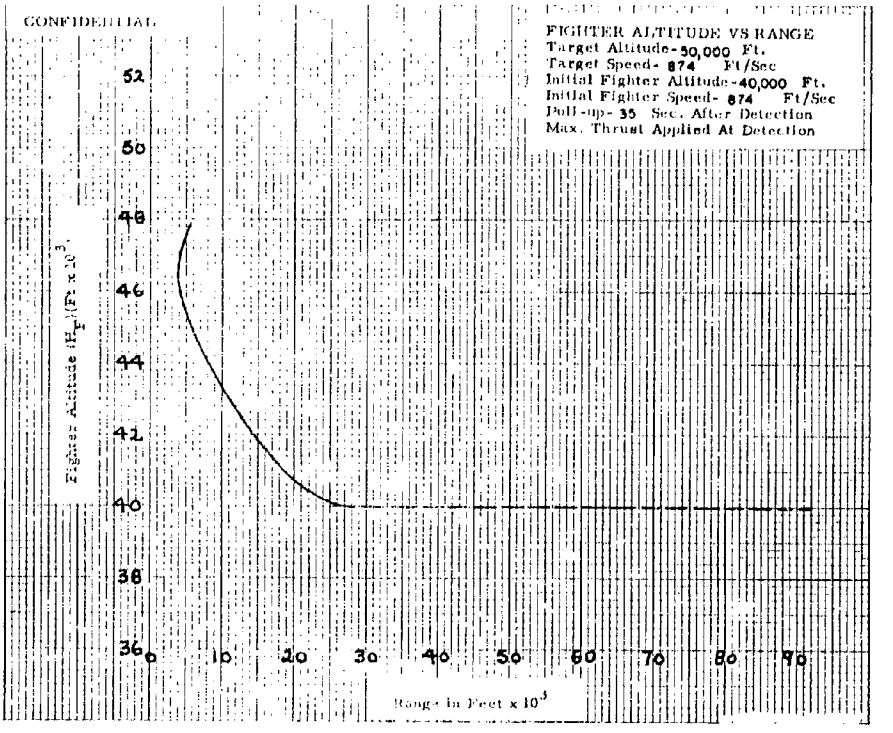

FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 30 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
52
50
48
46
44
42
40
38
36
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3
CONFIDENTIAL

Figure 513


FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 35 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F) (Ft x 10^3)
52
50
48
46
44
42
40
38
36
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3

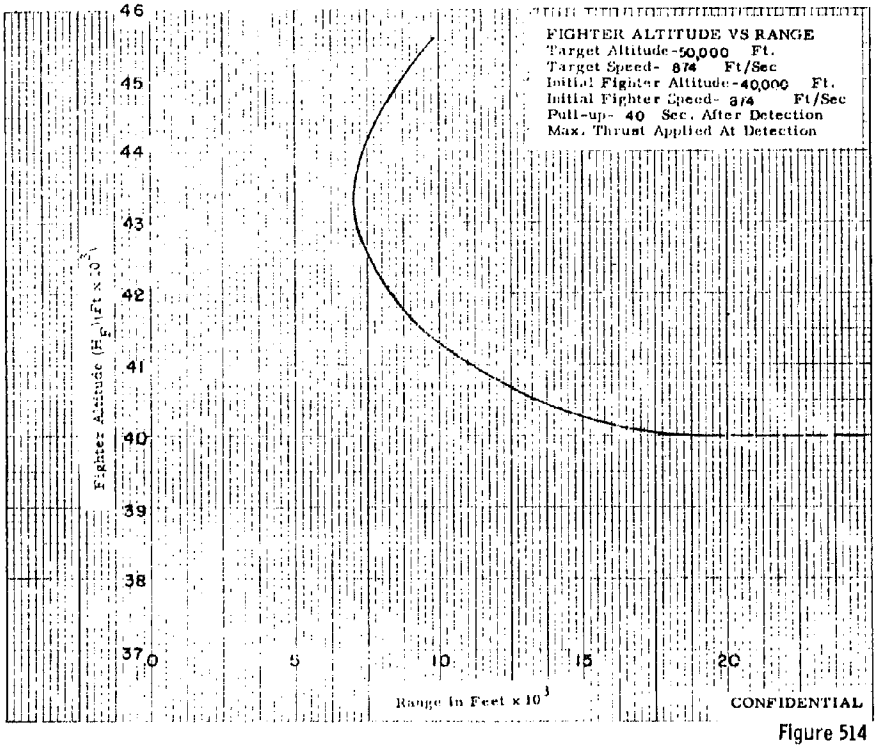

FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 40 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F) (Ft x 10^3)
46
45
44
43
42
41
40
39
38
37
0
5
10
15
20
Range in Feet x 10^3

Figure 514

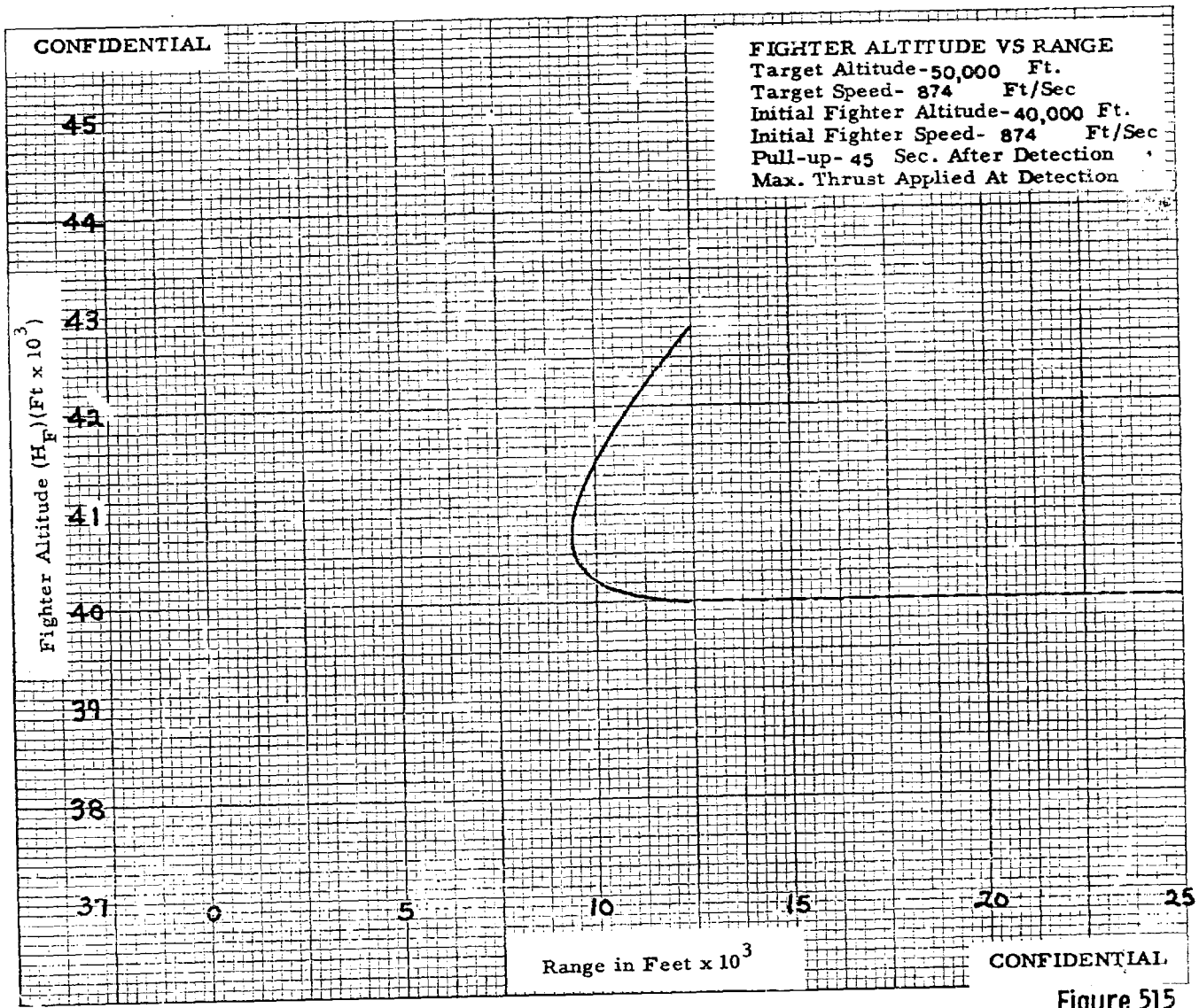
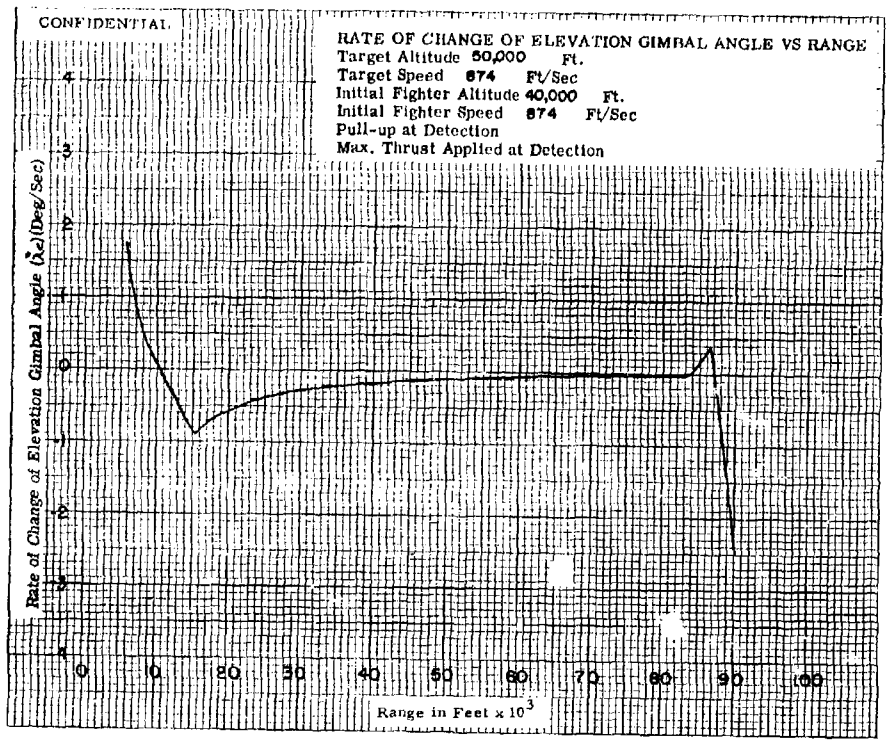

CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 45 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
45
44
43
42
41
40
39
38
37
0
5
10
15
20
25
Range in Feet x 10^3
CONFIDENTIAL

Figure 515


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_E$)(Deg/Sec)
4
3
2
1
0
-1
-2
-3
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

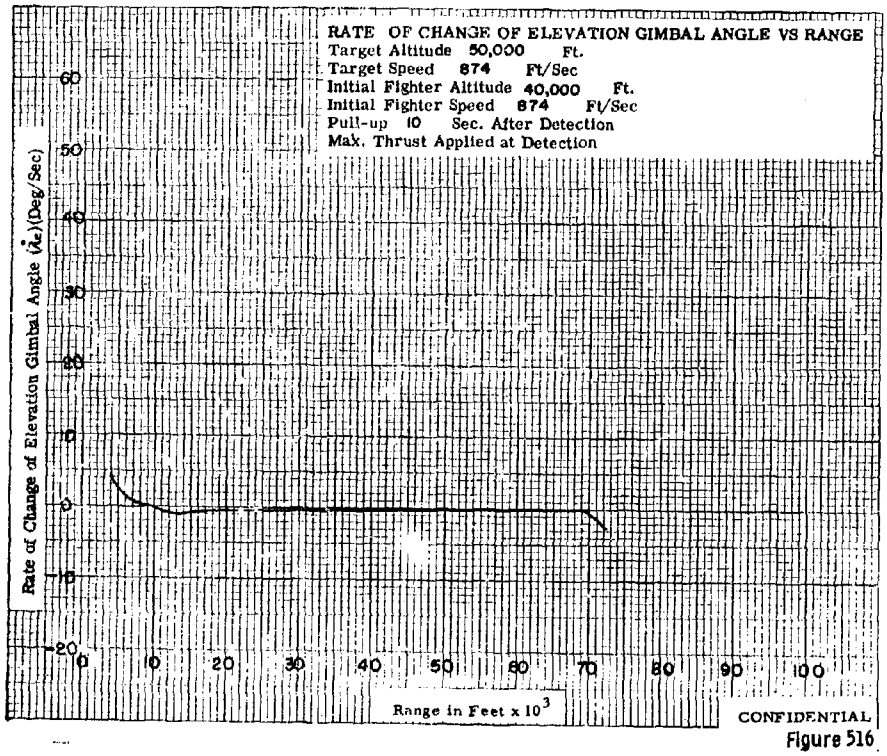
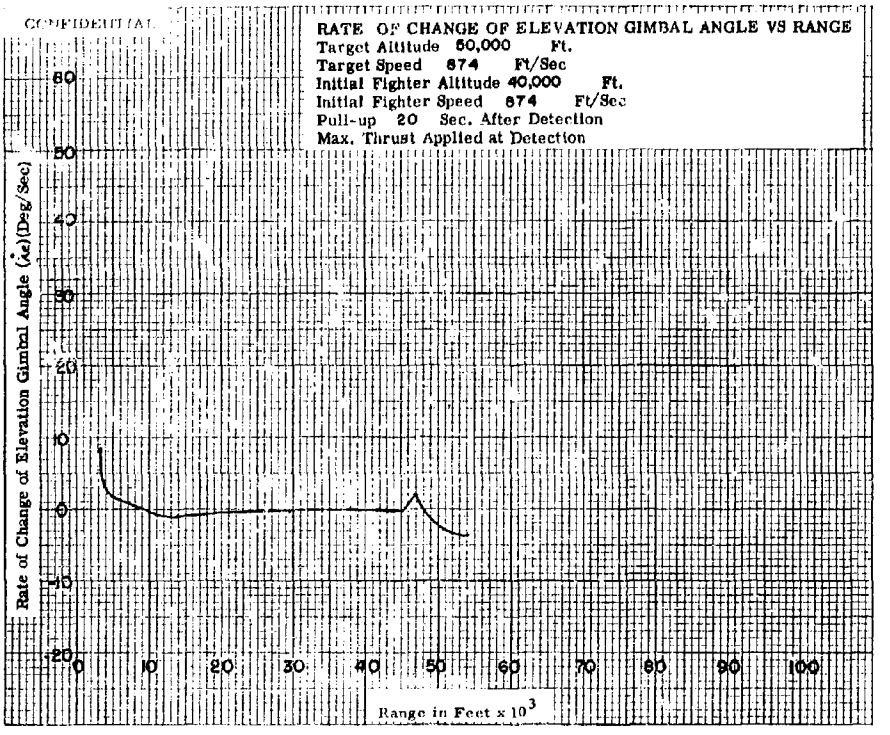

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_E$)(Deg/Sec)
60
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 516


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (Ae)(Deg/Sec)
60
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

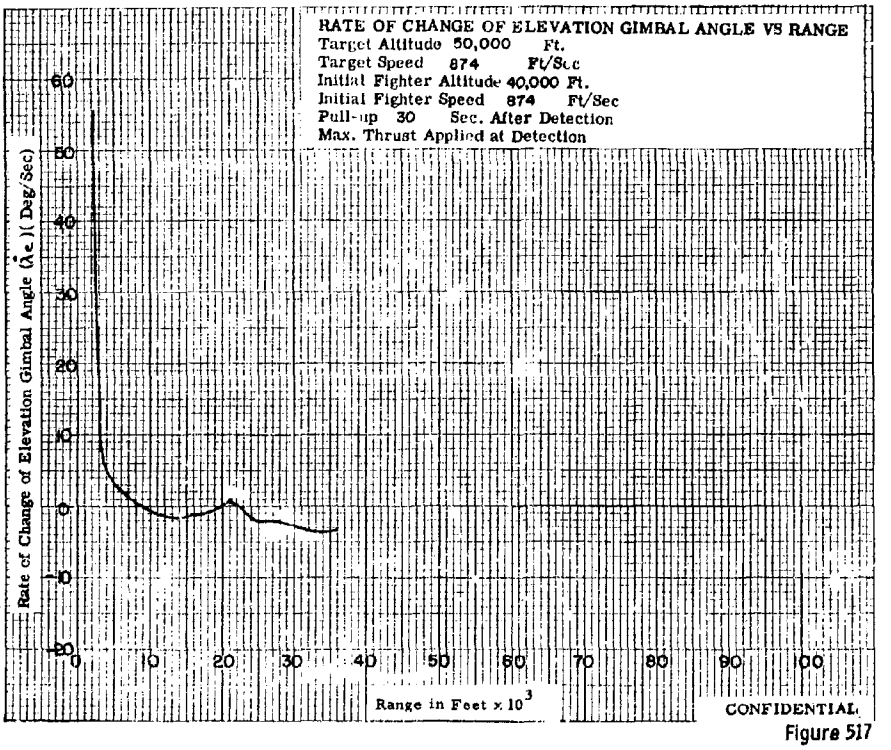
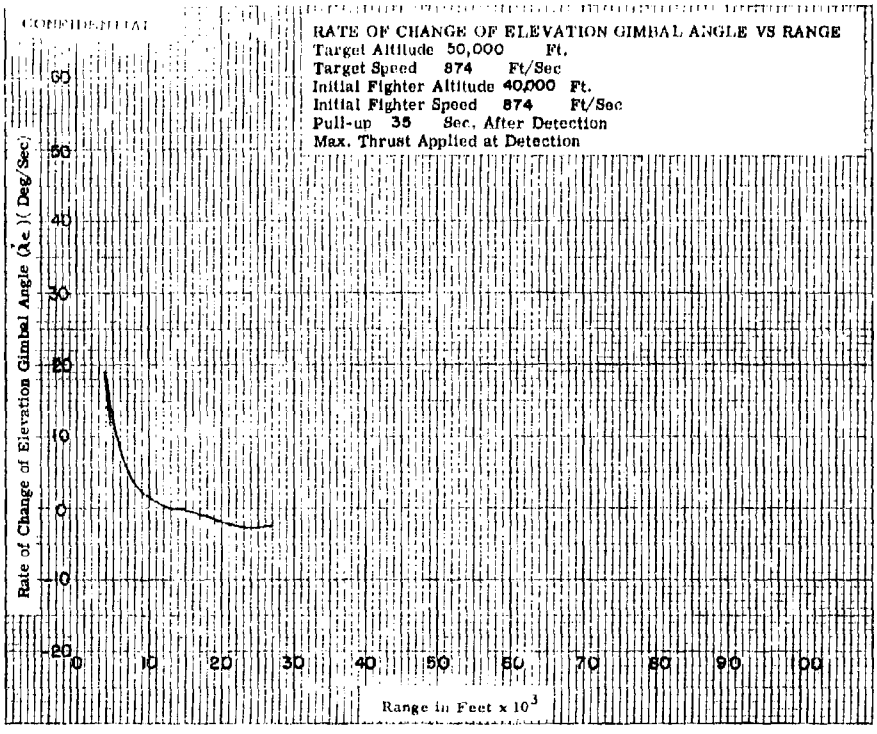
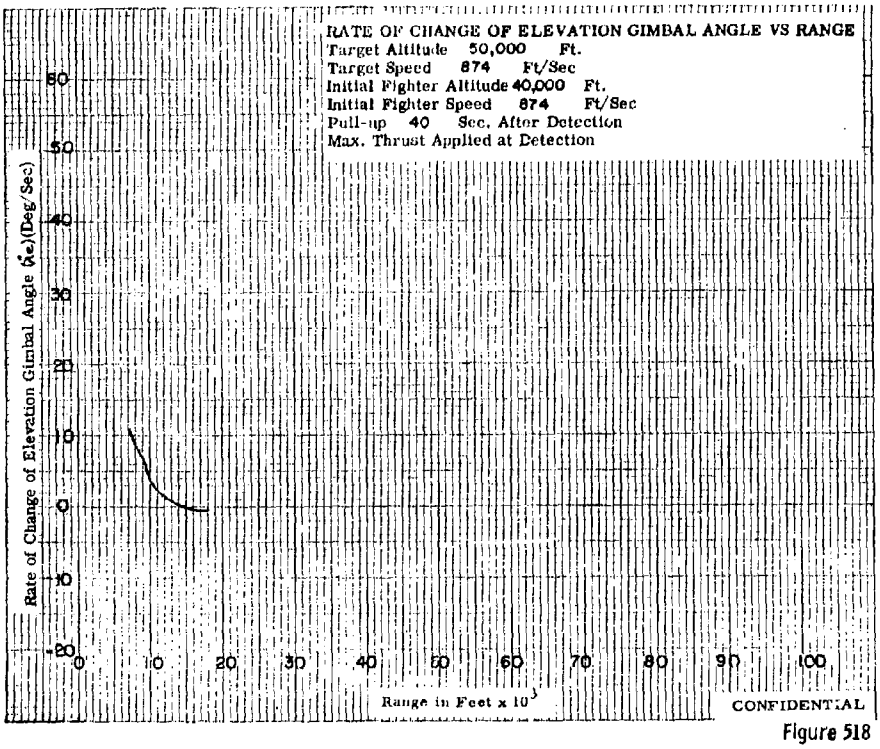

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (Ae)(Deg/Sec)
60
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 517

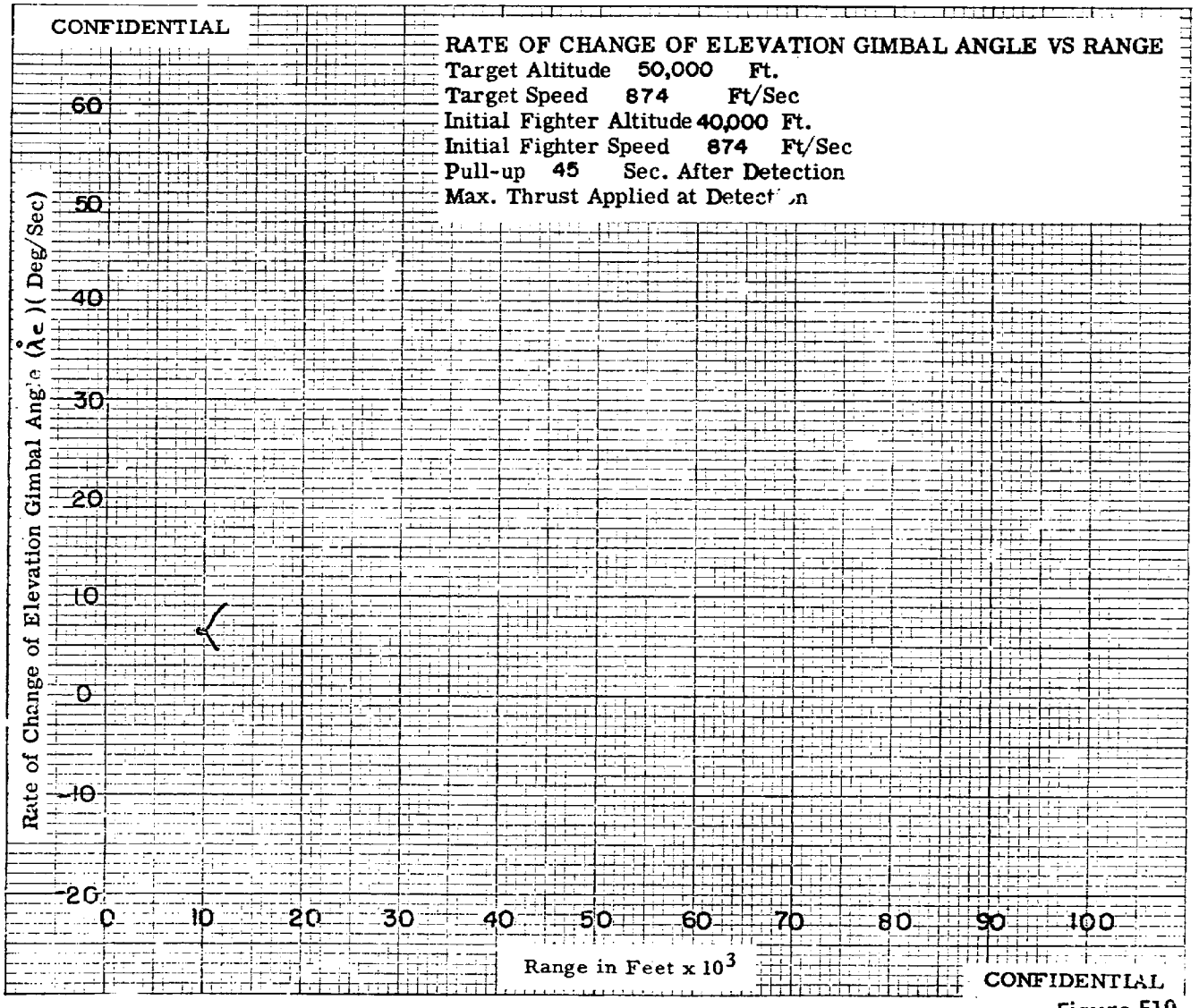
CONFIDENTIAL

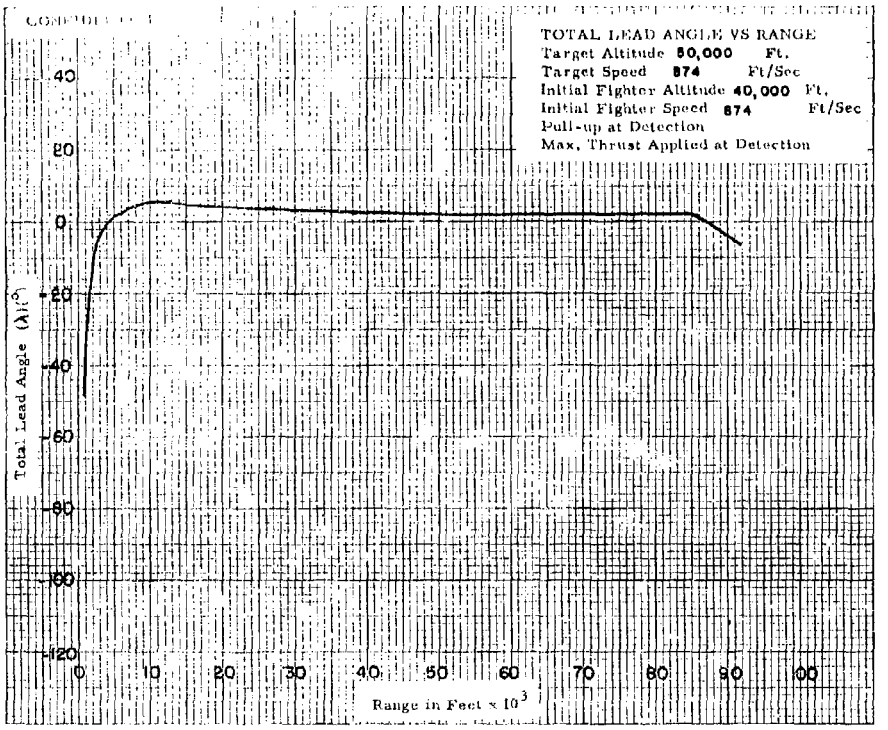


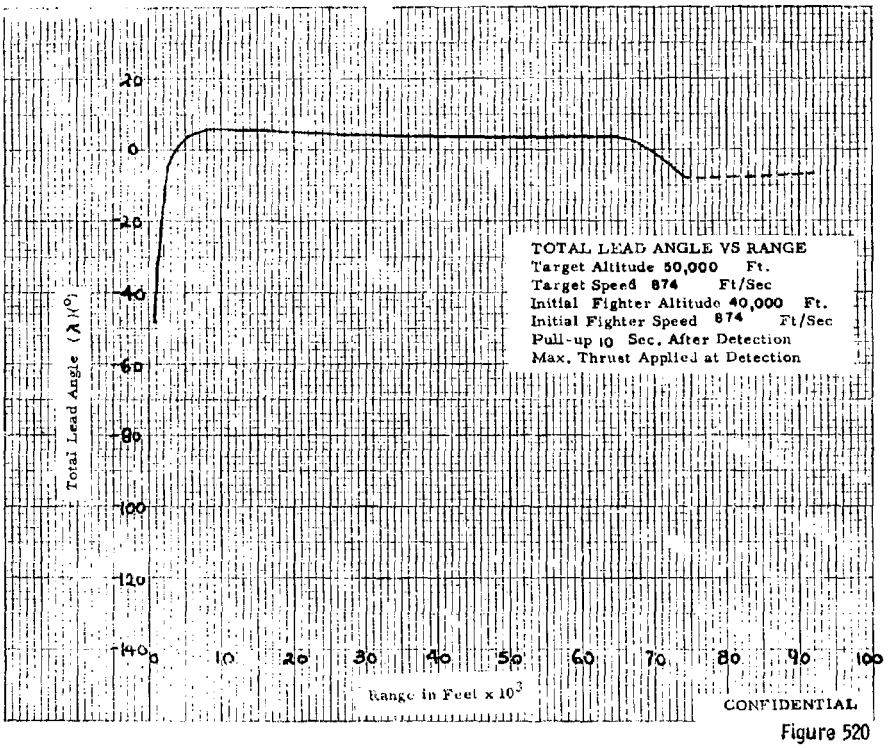


CONFIDENTIAL

Figure 518

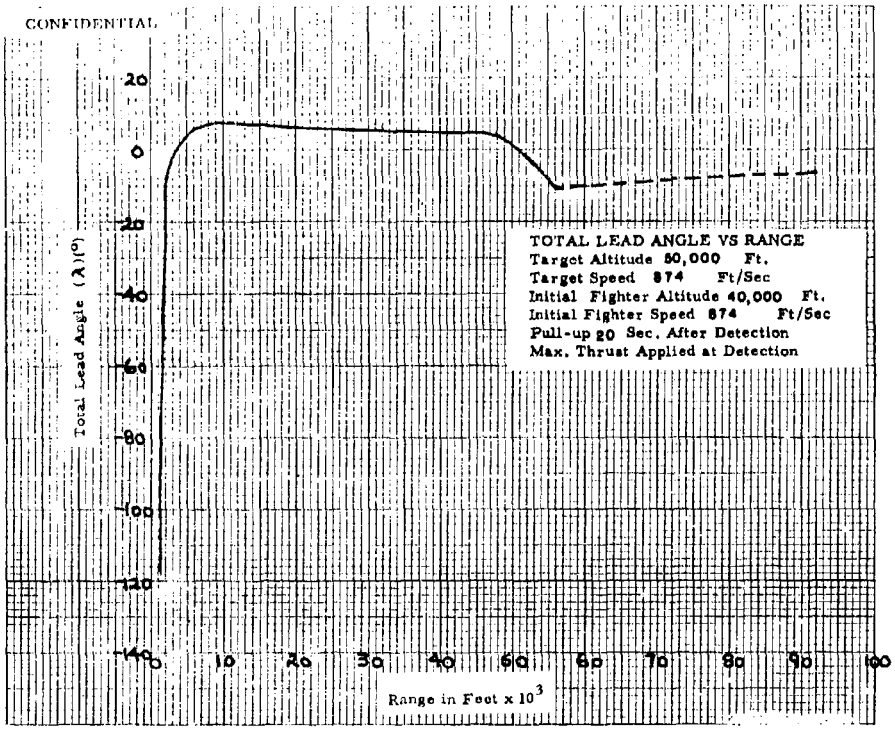

CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 45 Sec. After Detection
Max. Thrust Applied at Detect n
Rate of Change of Elevation Gimbal Angle (λ̇e) (Deg/Sec)
60
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL
Figure 519





CONFIDENTIAL

Figure 520


TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
20
0
-20
-40
-60
-80
-100
-120
-140
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

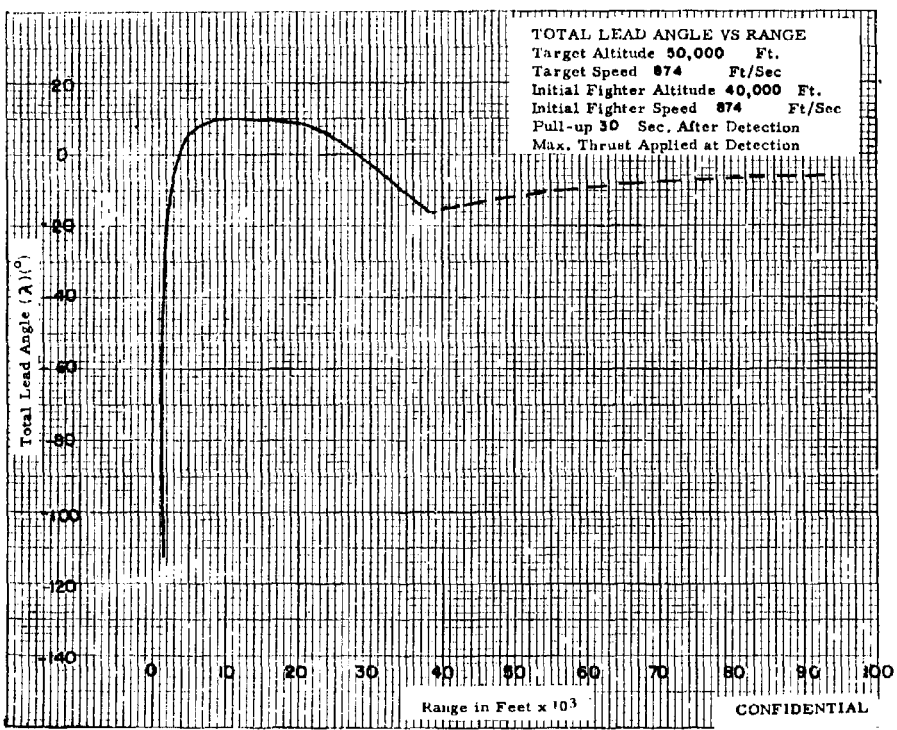
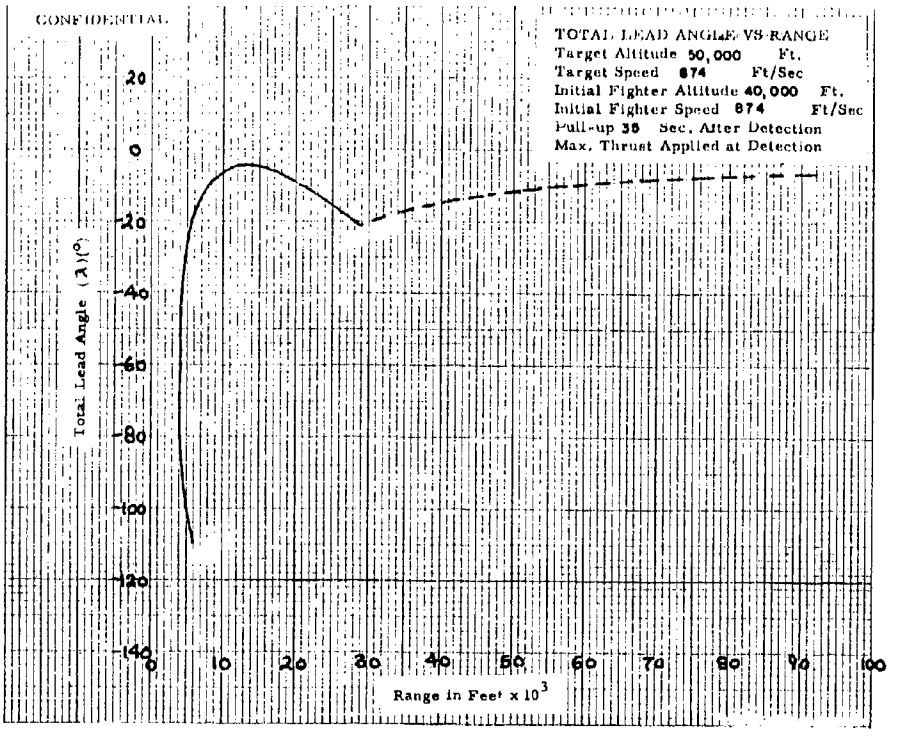

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
20
0
-20
-40
-60
-80
-100
-120
-140
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 521


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
20
0
-20
-40
-60
-80
-100
-120
-140
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

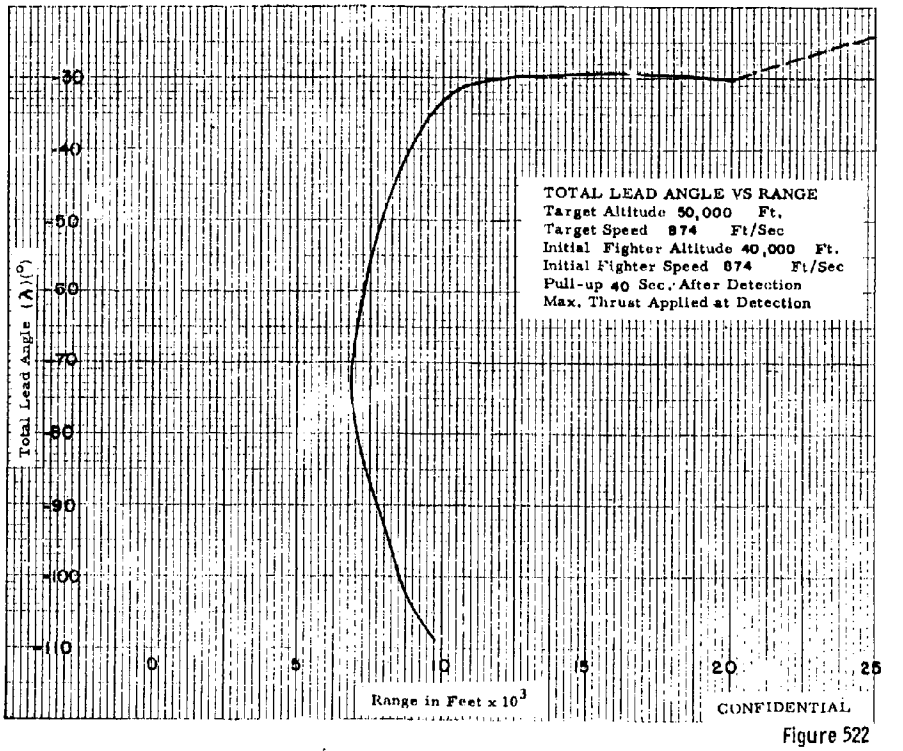

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 40 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
-30
-40
-50
-60
-70
-80
-90
-100
-110
0
5
10
15
20
25
Range in Feet x 10^3
CONFIDENTIAL

Figure 522

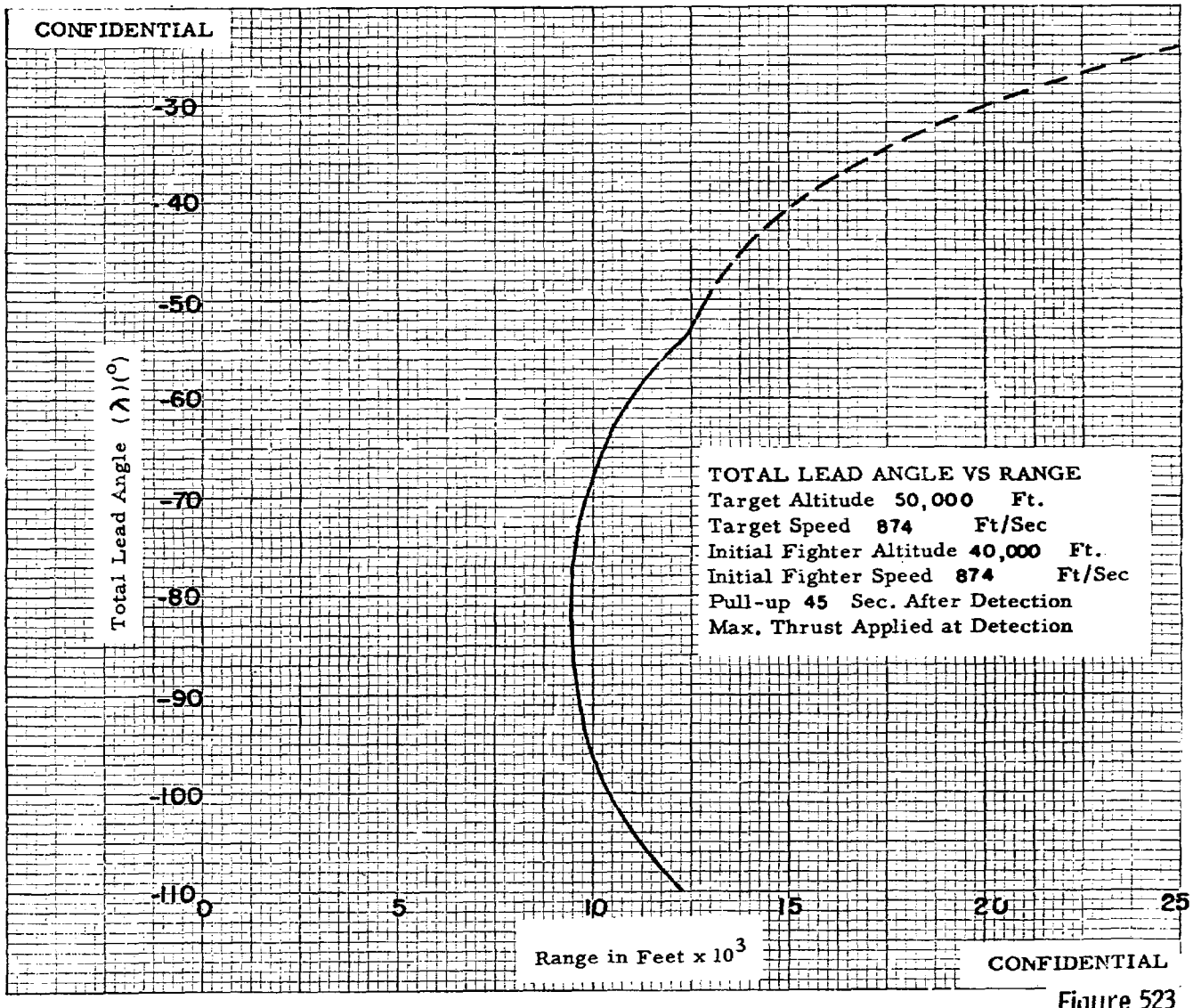
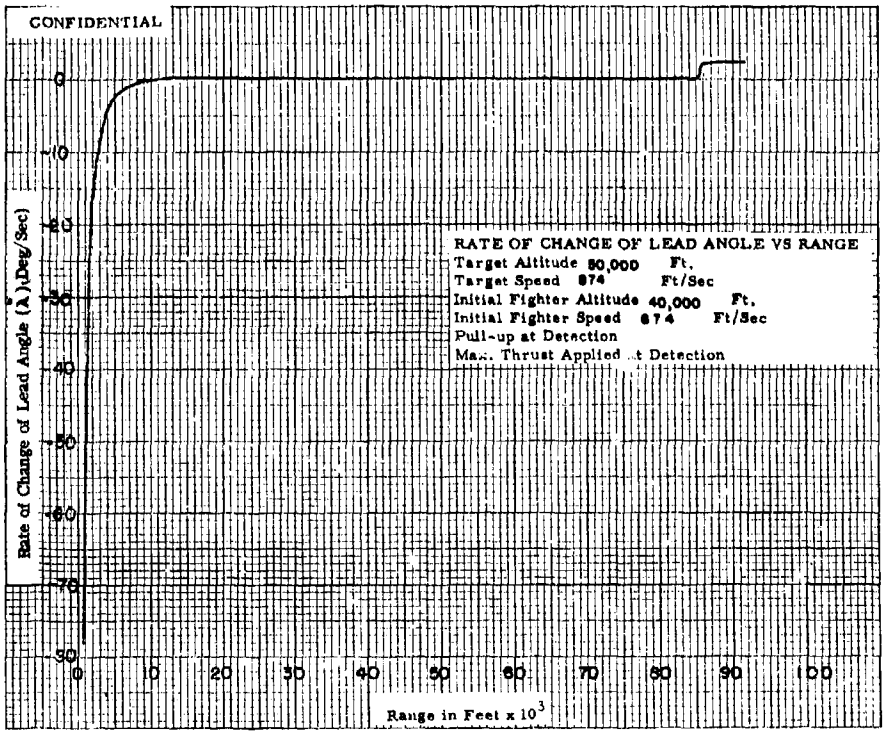

CONFIDENTIAL
-30
-40
-50
-60
-70
-80
-90
-100
-110
Total Lead Angle (λ)(°)
0
5
10
15
20
25
Range in Feet x 10^3
TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 45 Sec. After Detection
Max. Thrust Applied at Detection
CONFIDENTIAL

Figure 523


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
Range in Feet x 10³
0
-10
-20
-30
-40
-50
-60
-70
-80
0
10
20
30
40
50
60
70
80
90
100

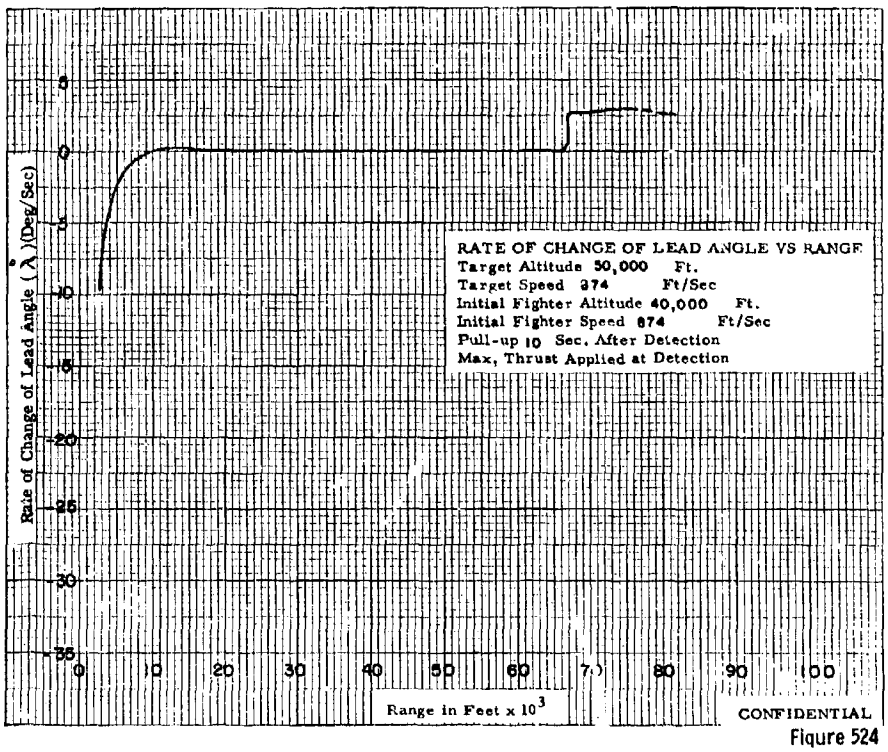
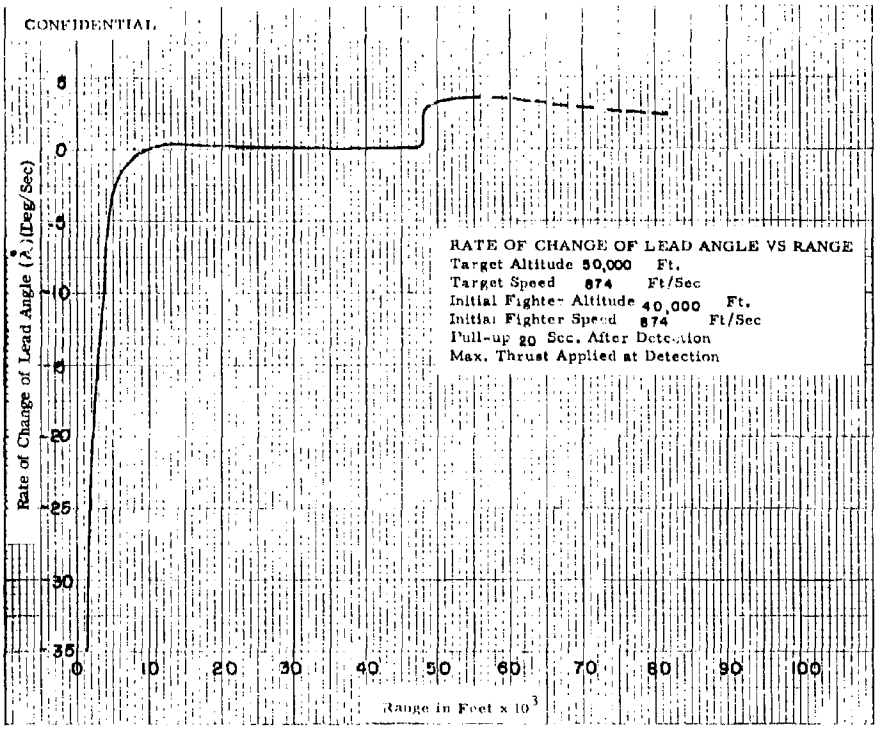

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max, Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
Range in Feet x 10³
5
0
-5
-10
-15
-20
-25
-30
-35
0
10
20
30
40
50
60
70
80
90
100

Figure 524


Rate of Change of Lead Angle ($\dot{\lambda}$) (Deg/Sec)
5
0
-5
-10
-15
-20
-25
-30
-35
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection

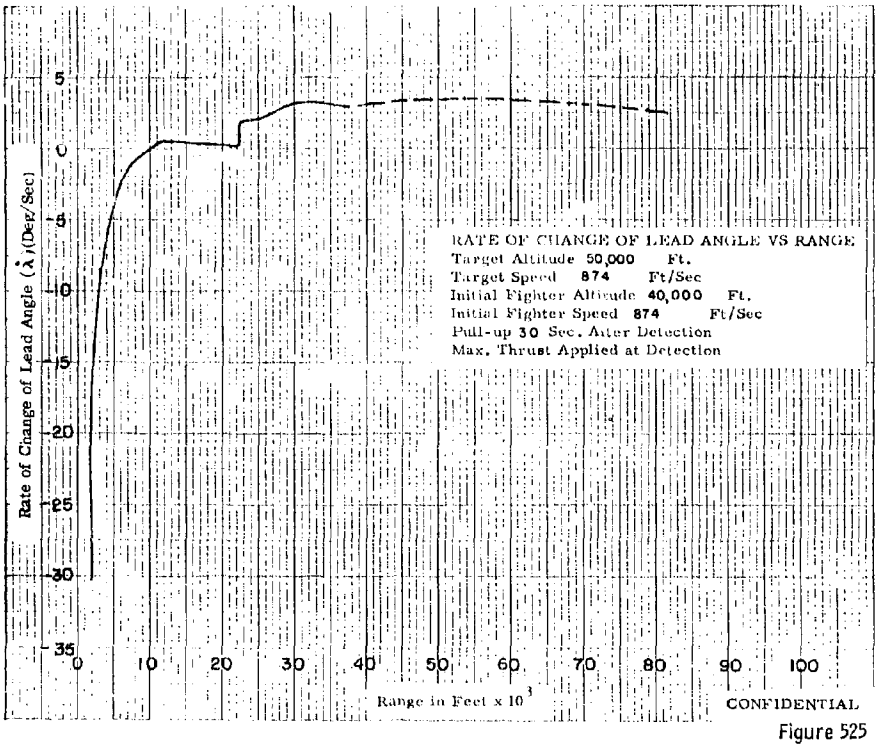

Rate of Change of Lead Angle ($\dot{\lambda}$) (Deg/Sec)
5
0
-5
-10
-15
-20
-25
-30
-35
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection

Figure 525

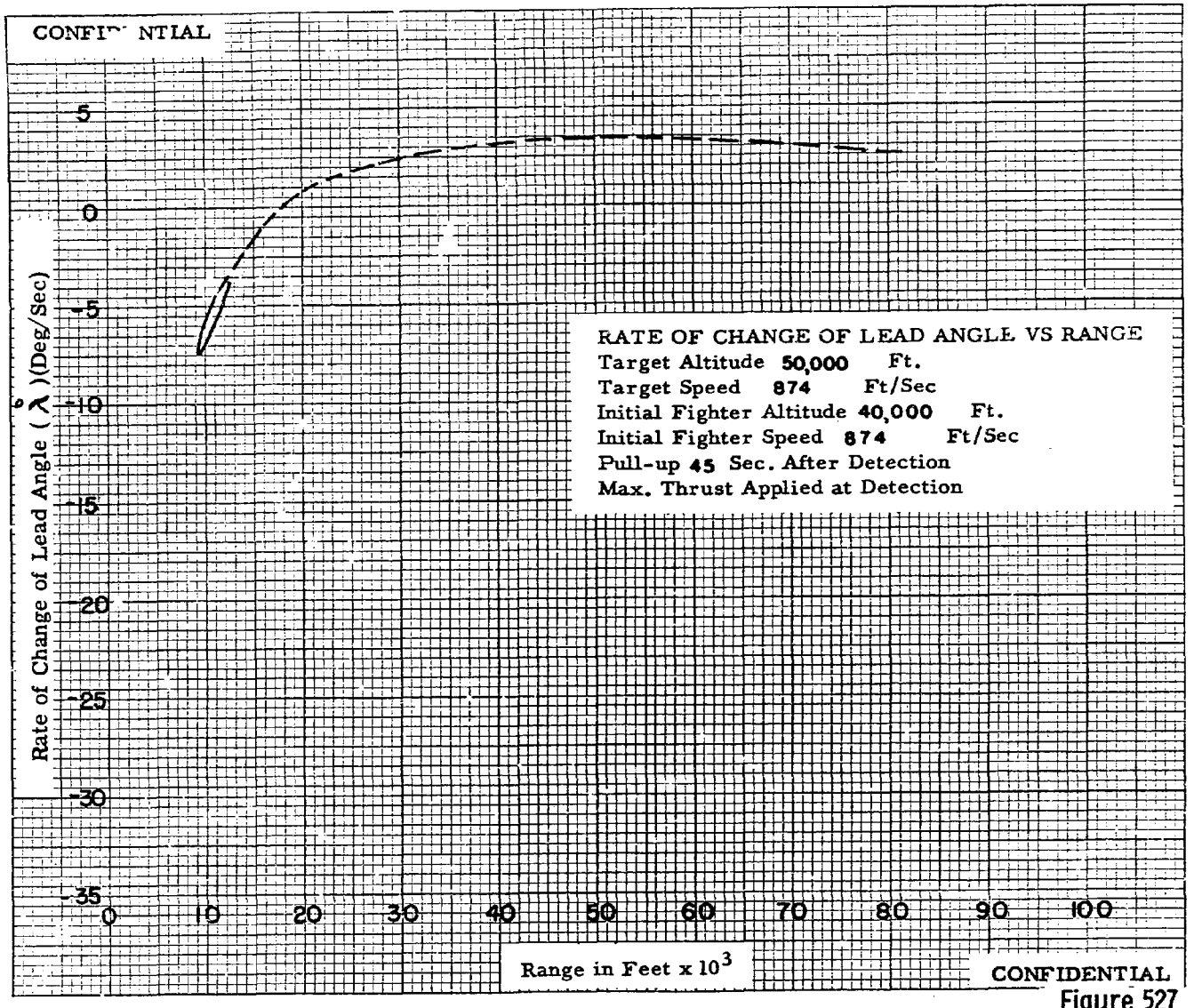
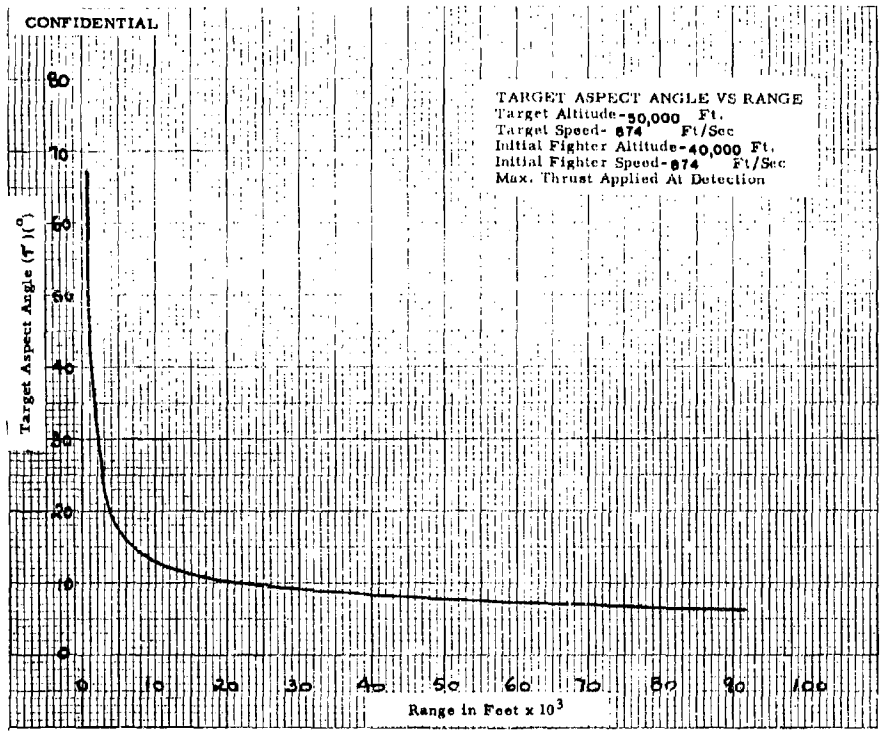
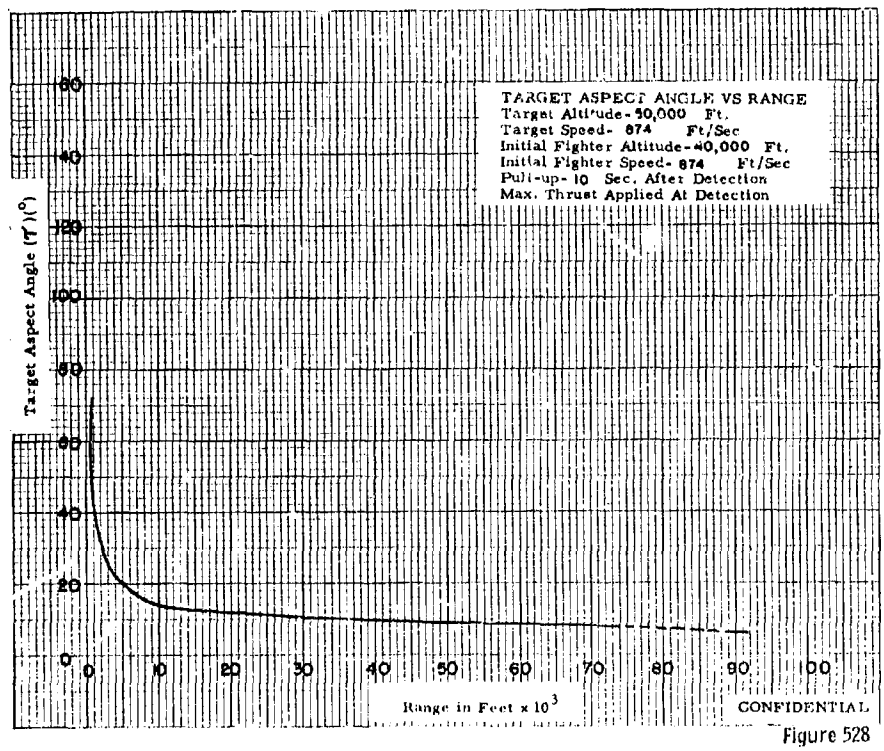

CONFI NTIAL
5
0
-5
-10
-15
-20
-25
-30
-35
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 45 Sec. After Detection
Max. Thrust Applied at Detection
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 527

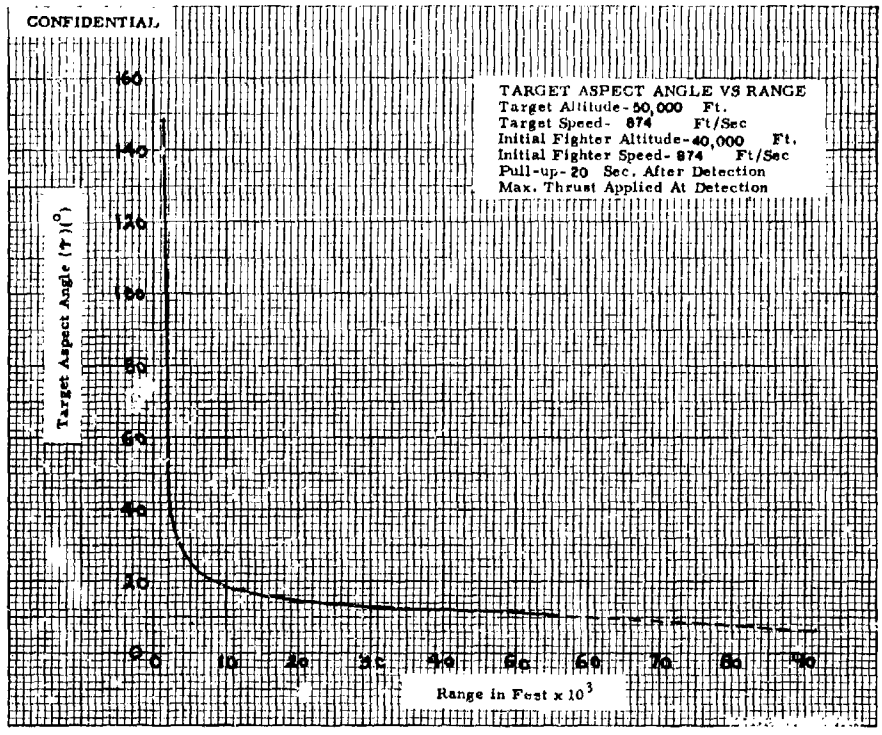
CONFIDENTIAL





CONFIDENTIAL

Figure 528


TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (γ)(°)
Range in Feet x 10³

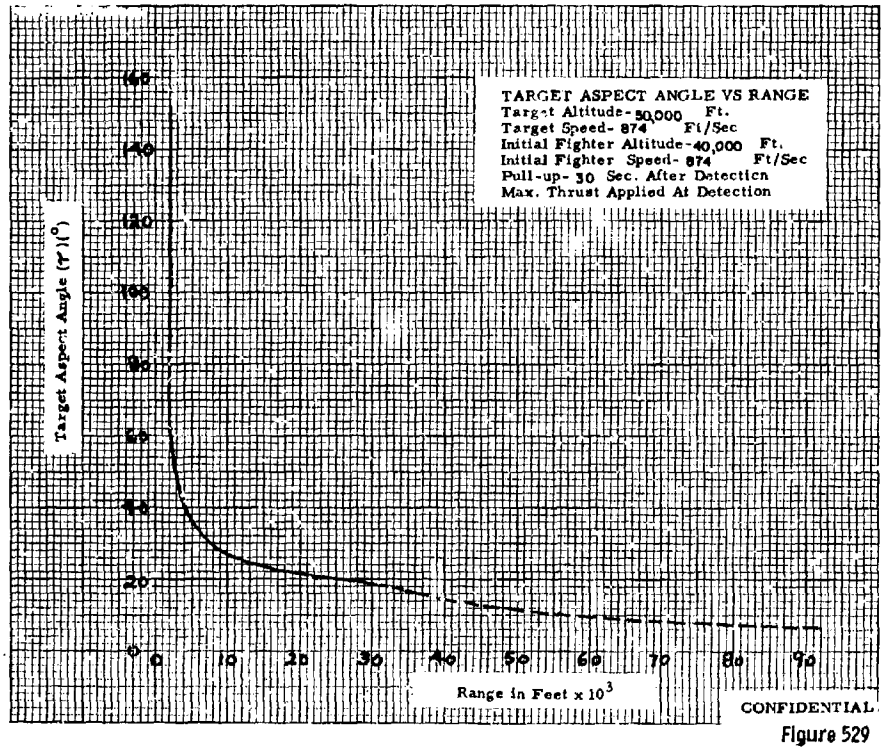
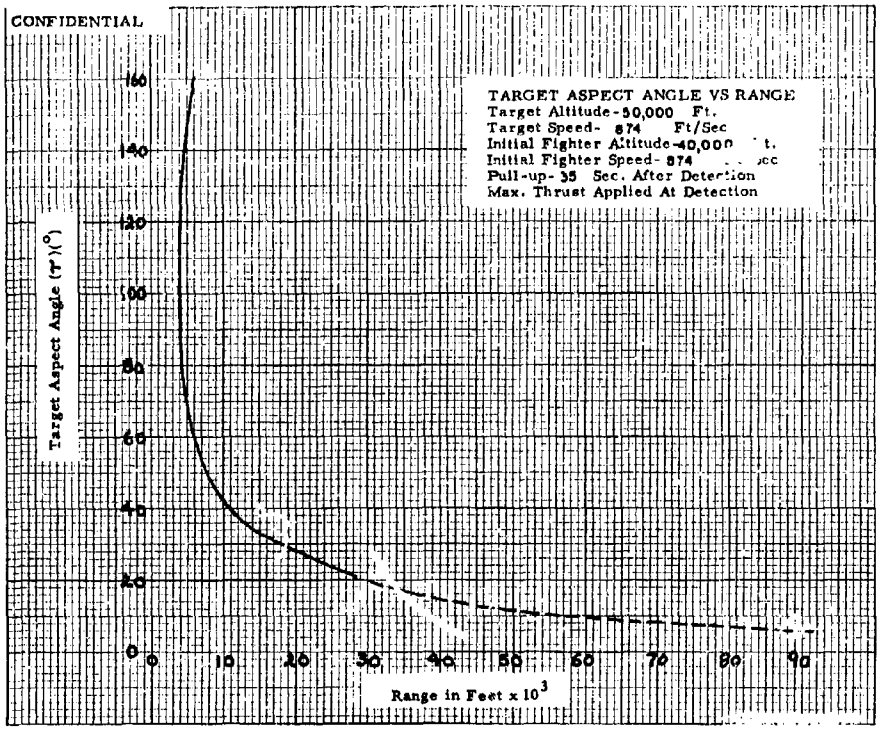
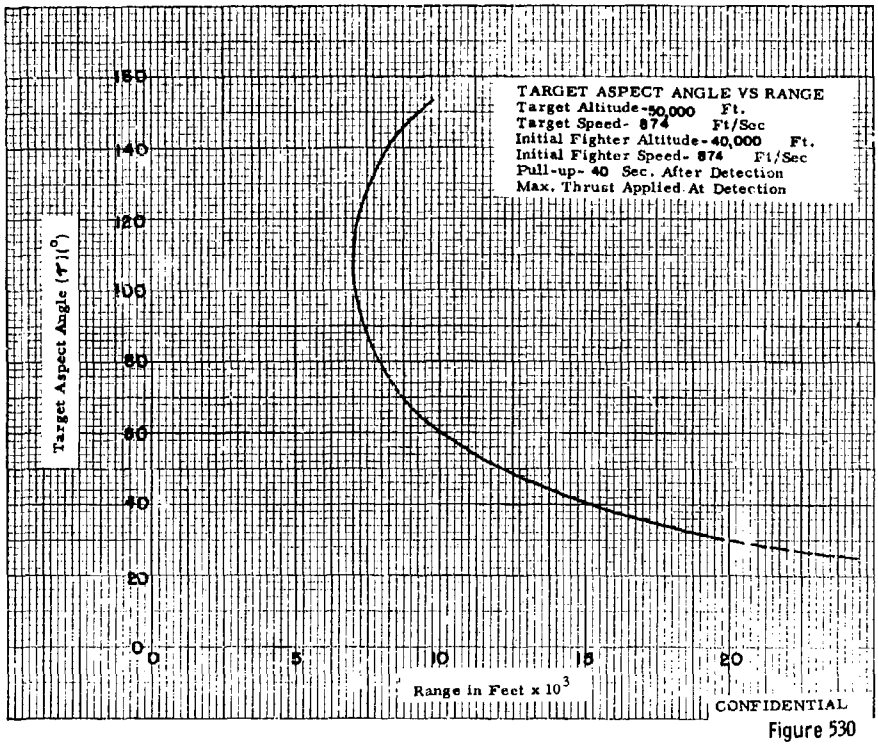

TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 30 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (γ)(°)
Range in Feet x 10³

Figure 529

CONFIDENTIAL





CONFIDENTIAL

Figure 530

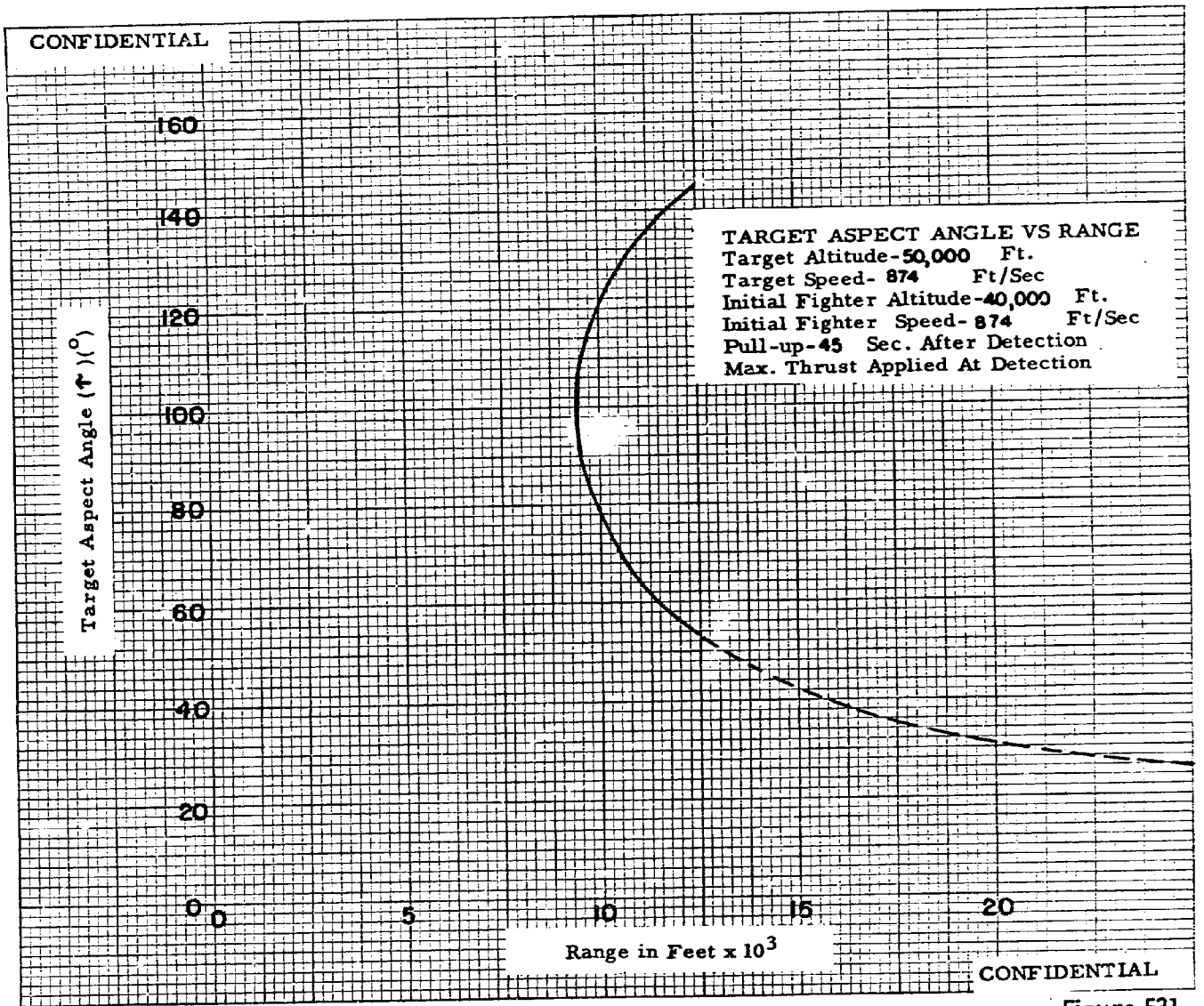
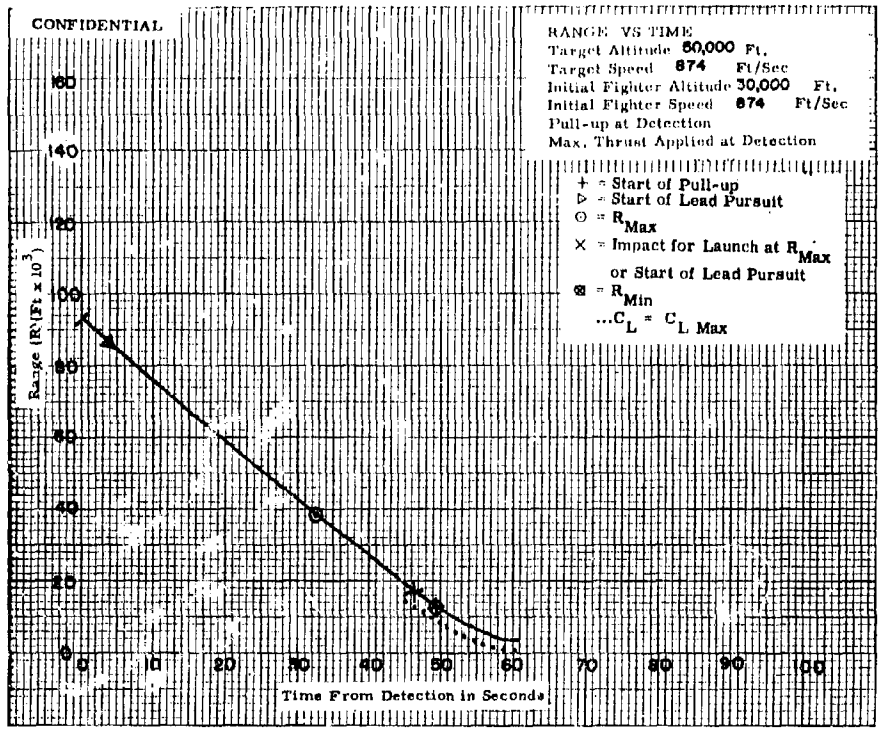

CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up-45 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (↑)(°)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
Range in Feet x 10³
CONFIDENTIAL

Figure 531


RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

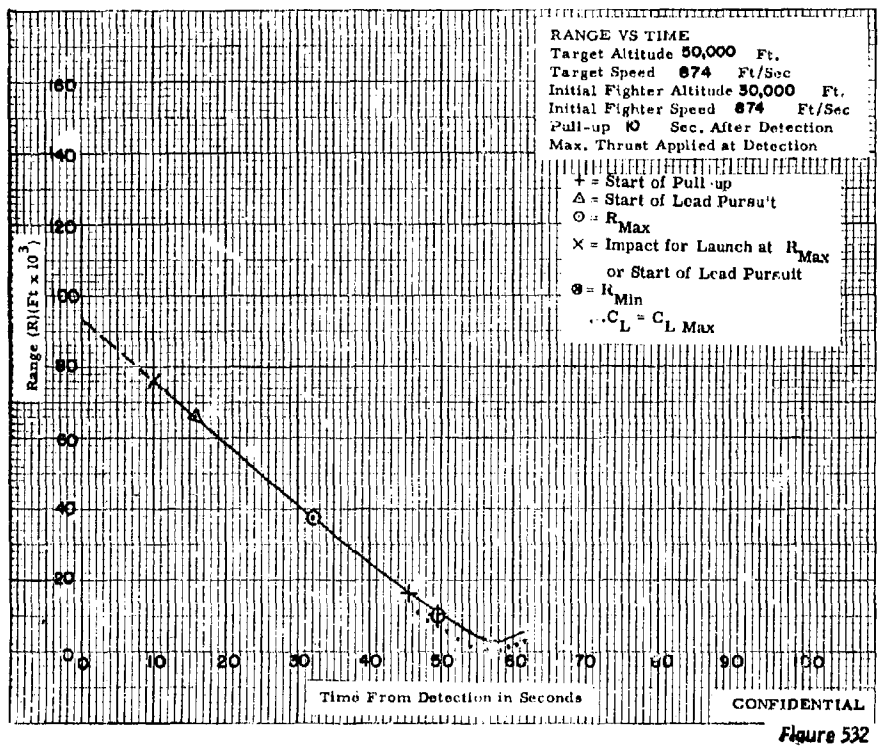
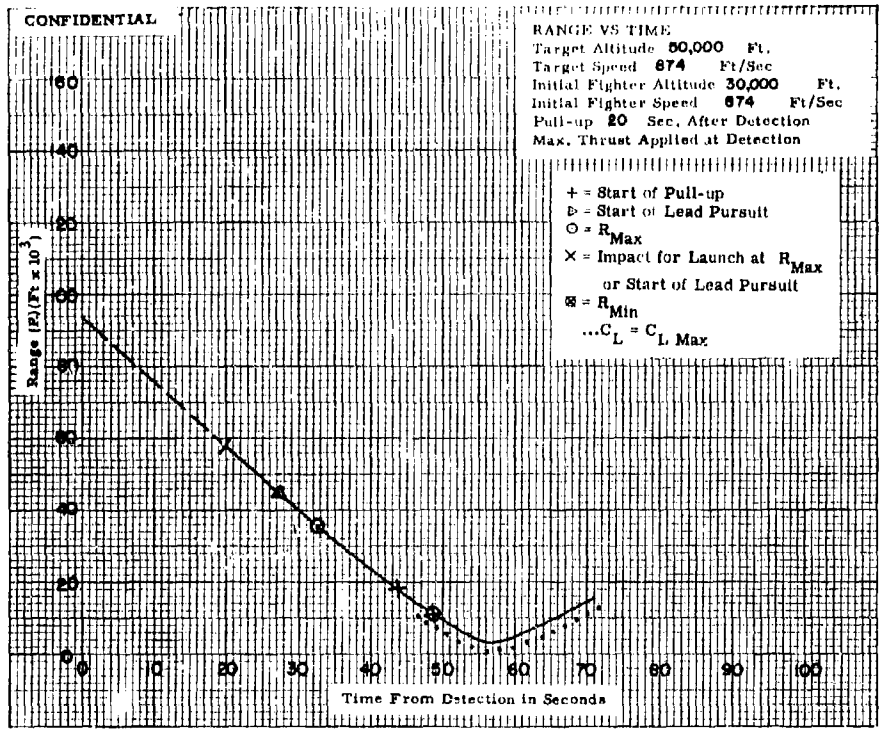

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
Δ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

Figure 532


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

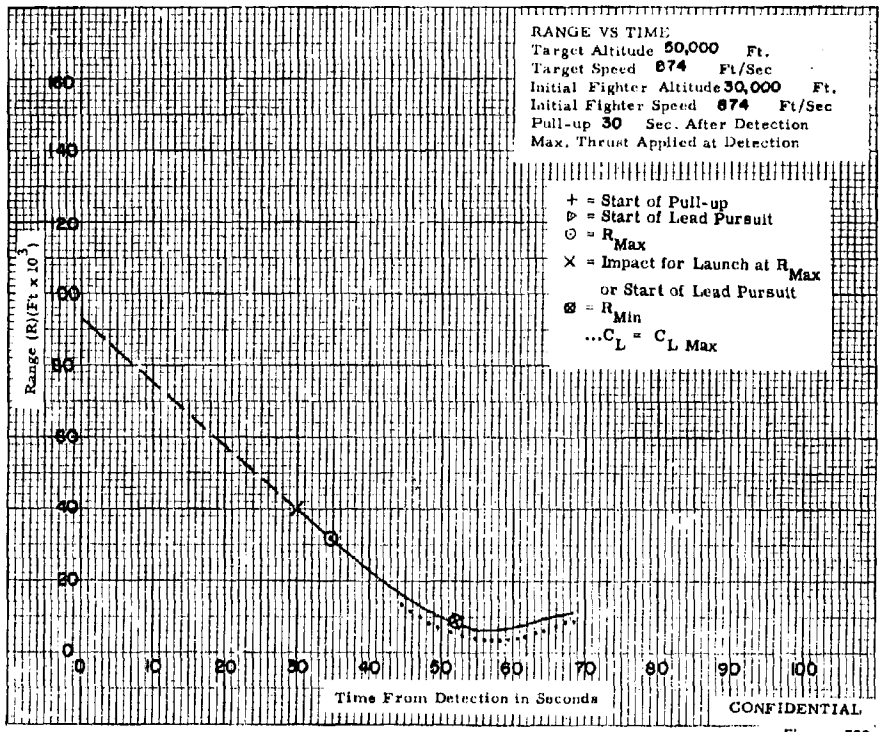
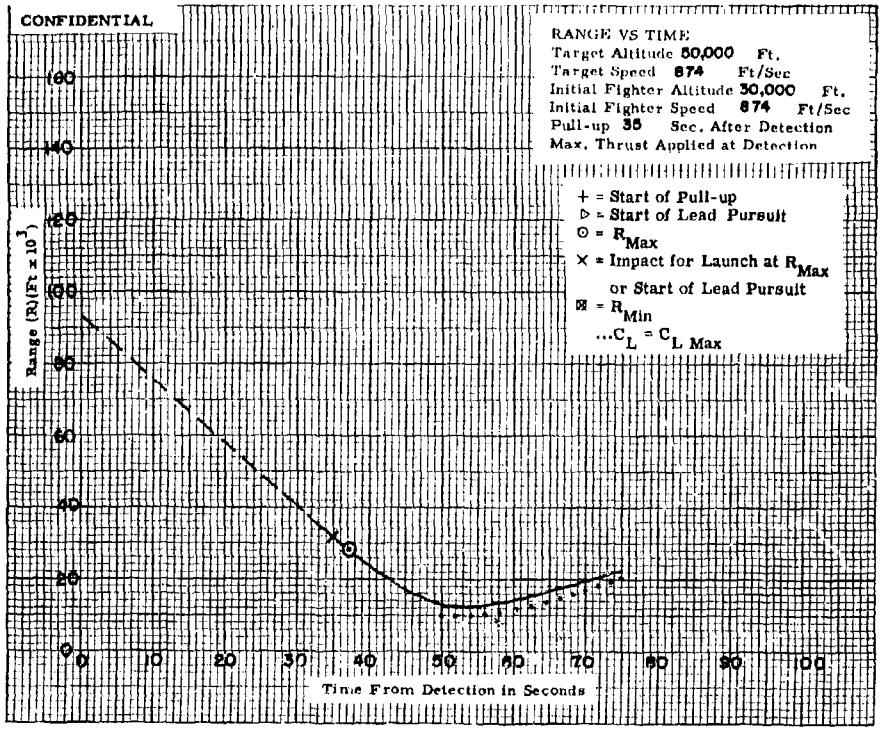

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 533


RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

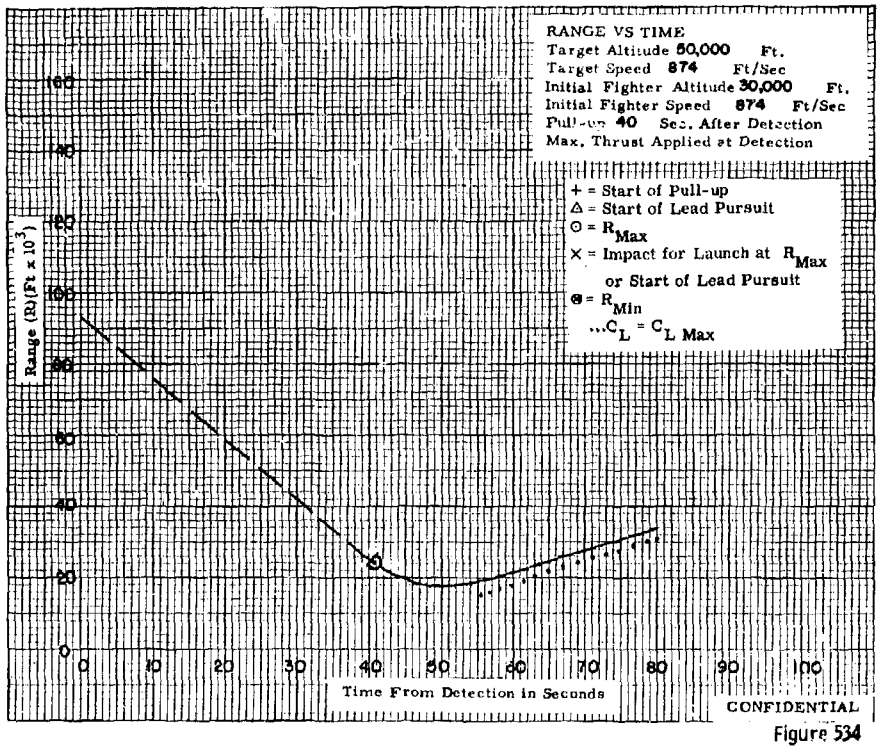
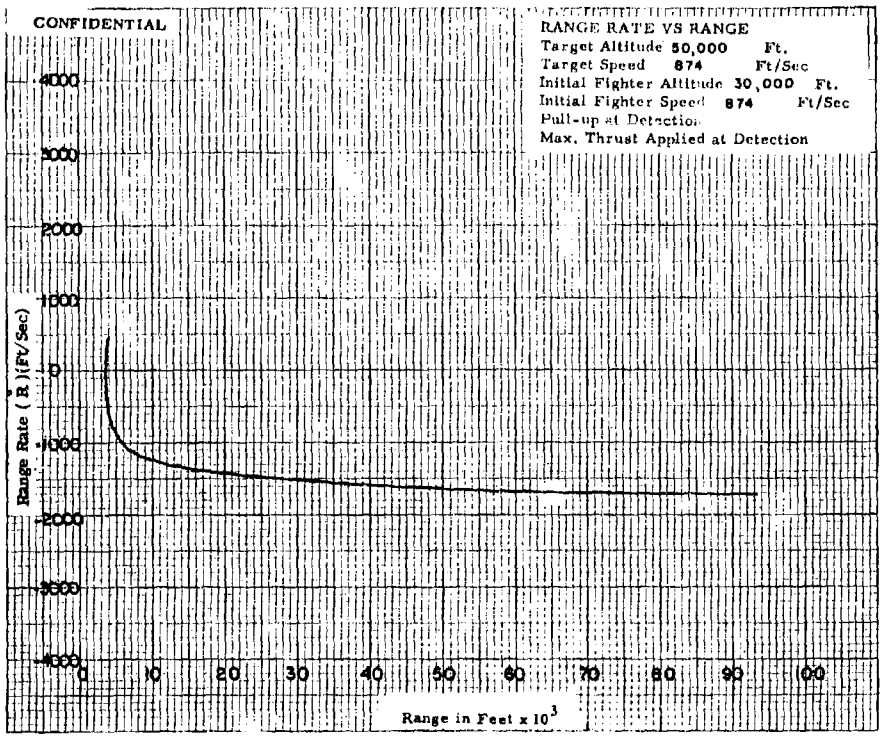

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 40 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

Figure 534


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(FV/Sec)
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

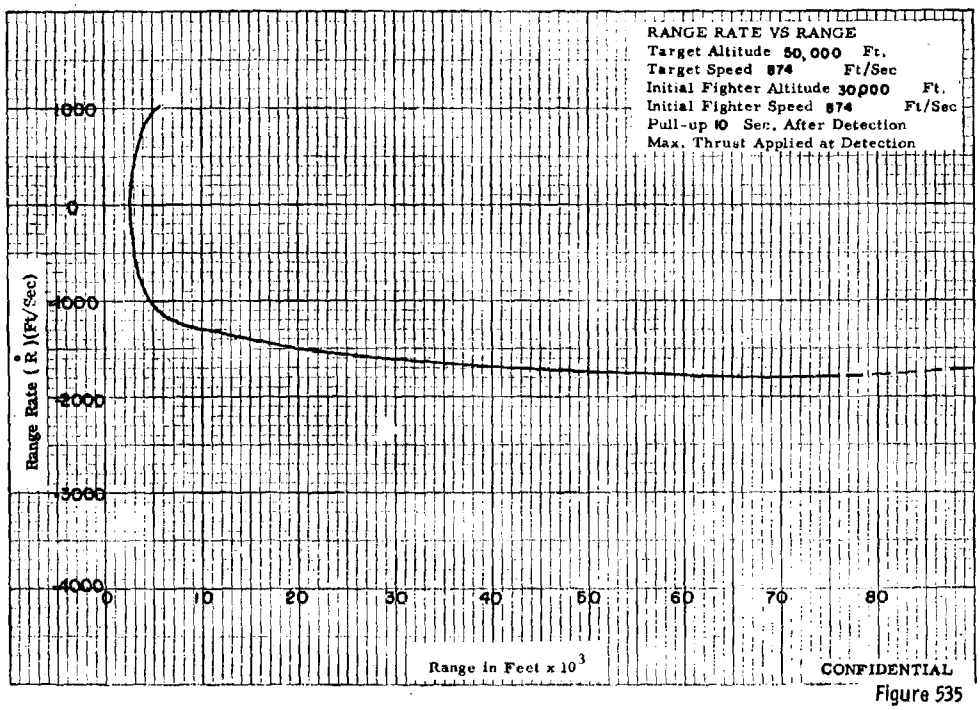
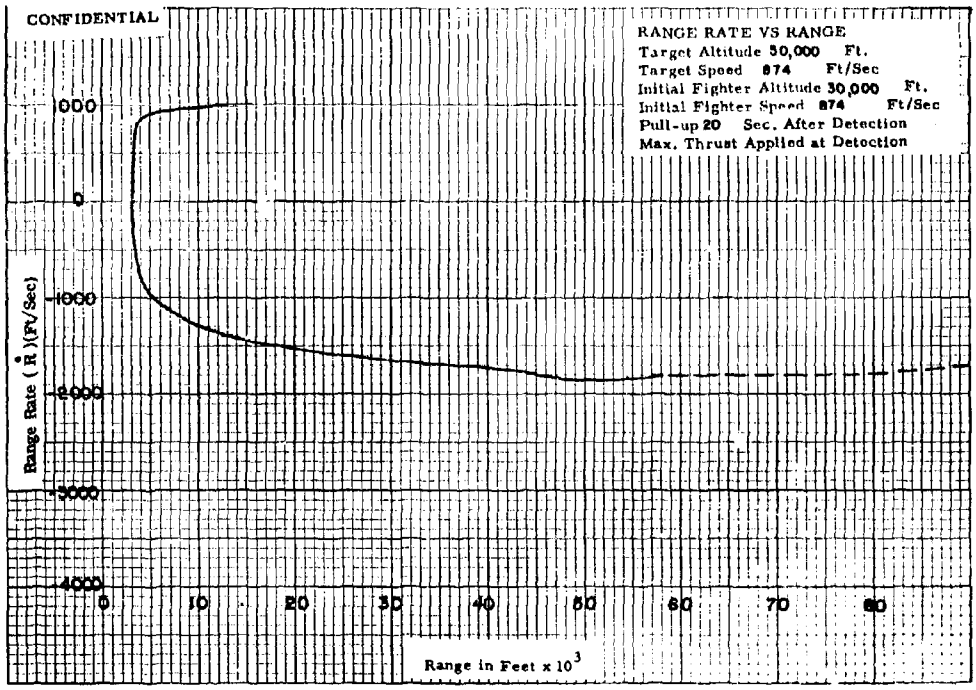

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(FV/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 535


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

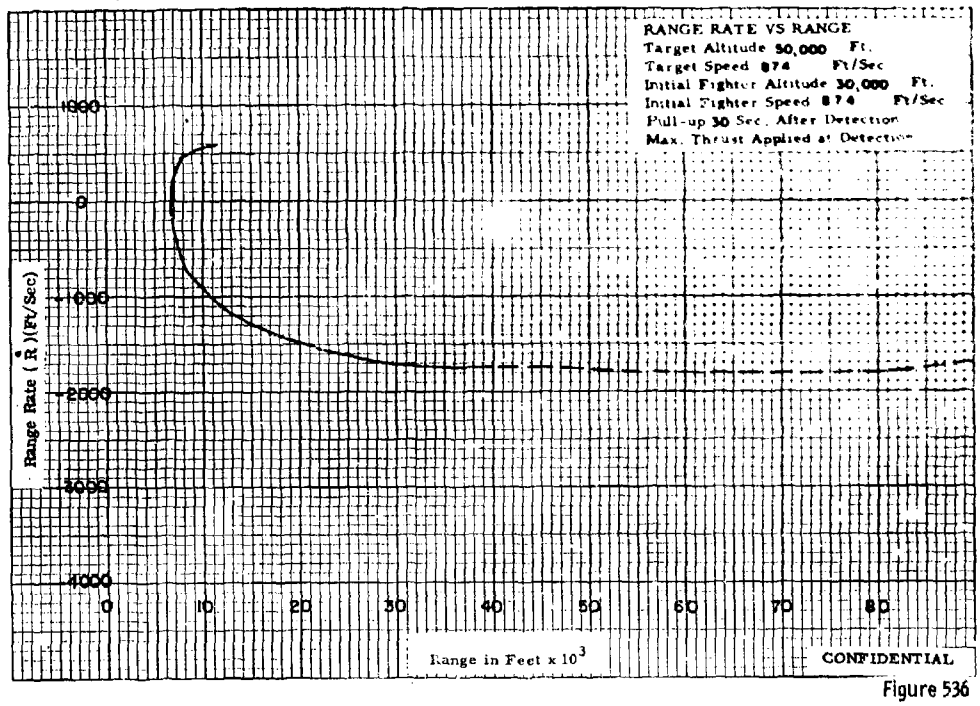
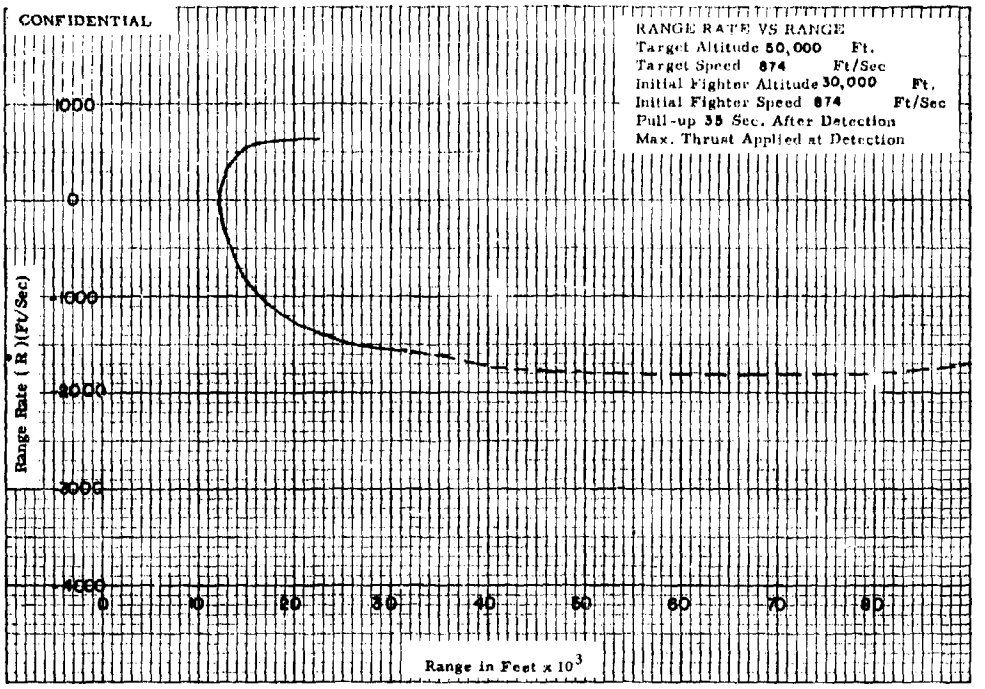

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 536


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

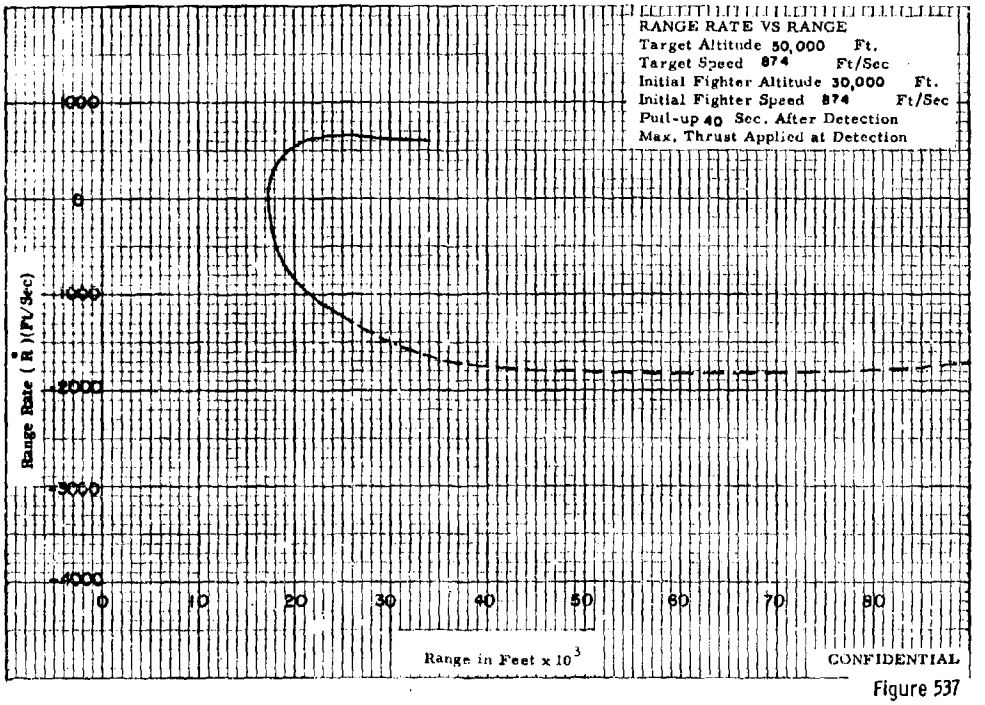
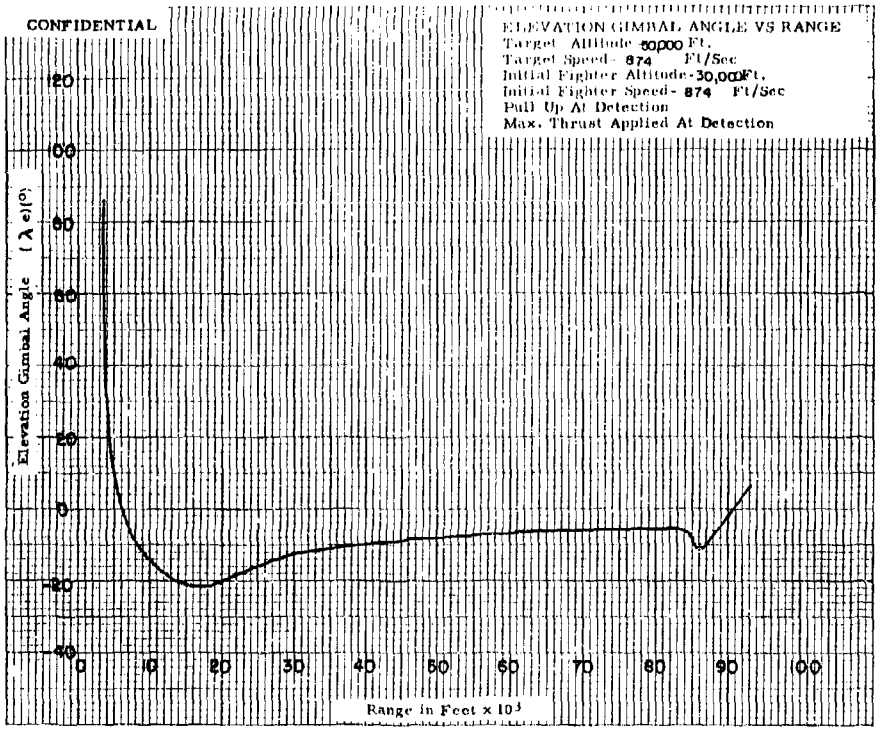
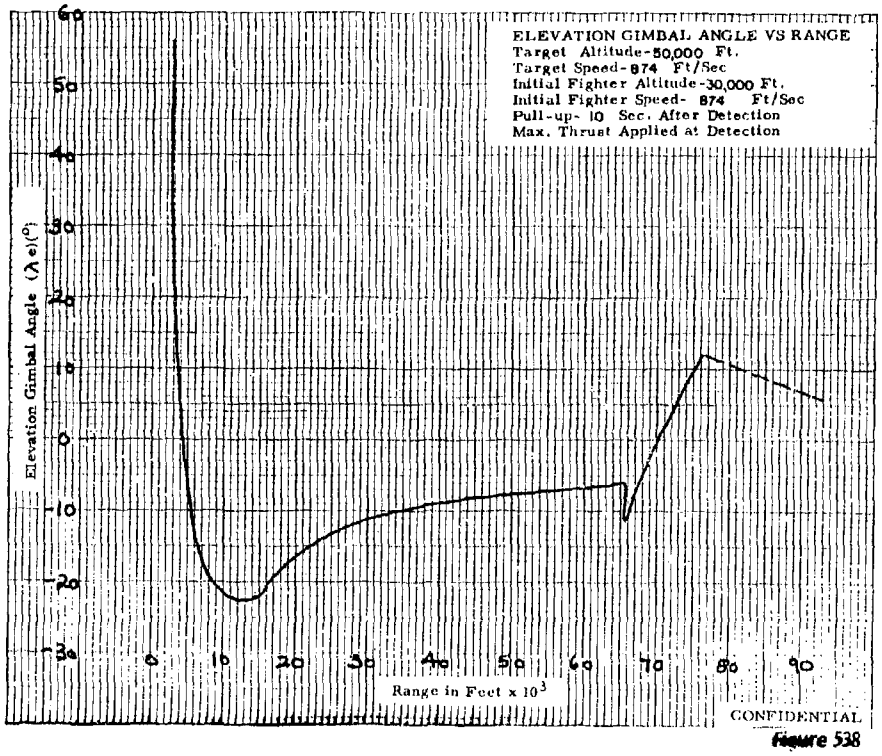

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 40 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

Figure 537

CONFIDENTIAL

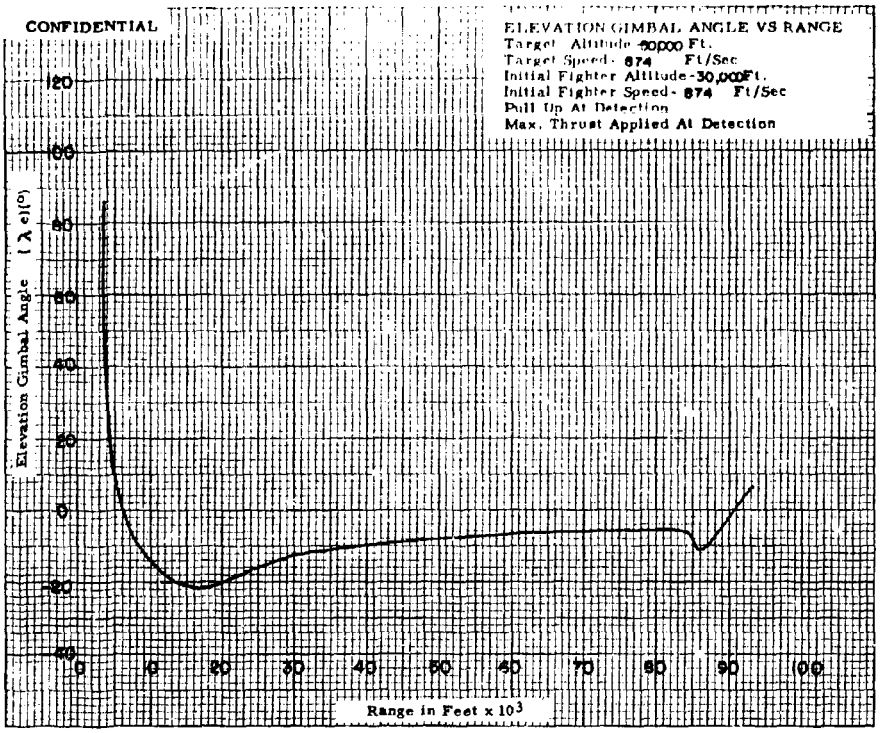


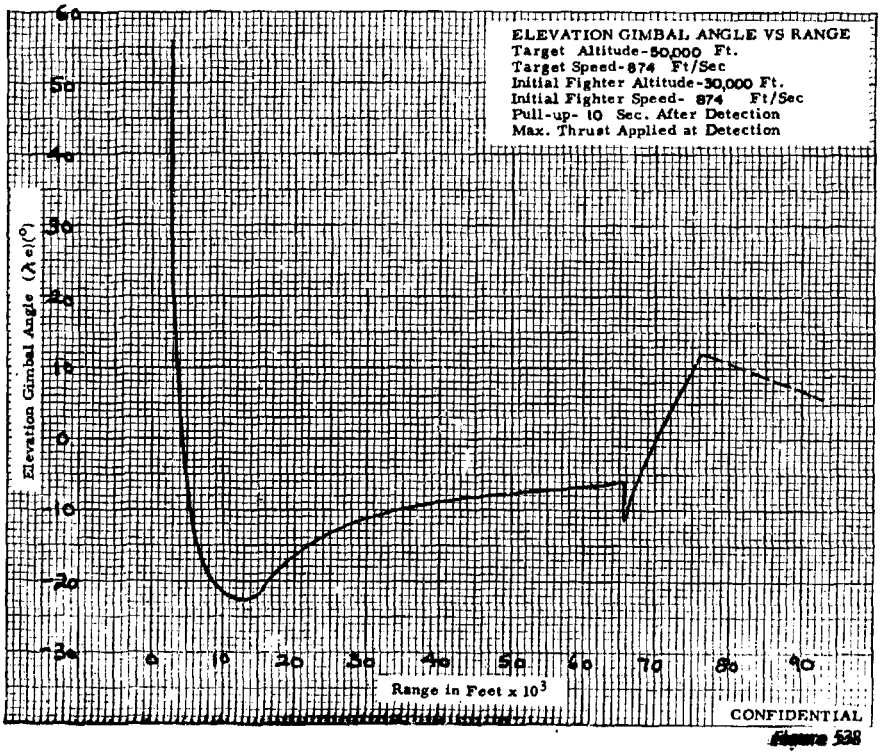


CONFIDENTIAL

Figure 538

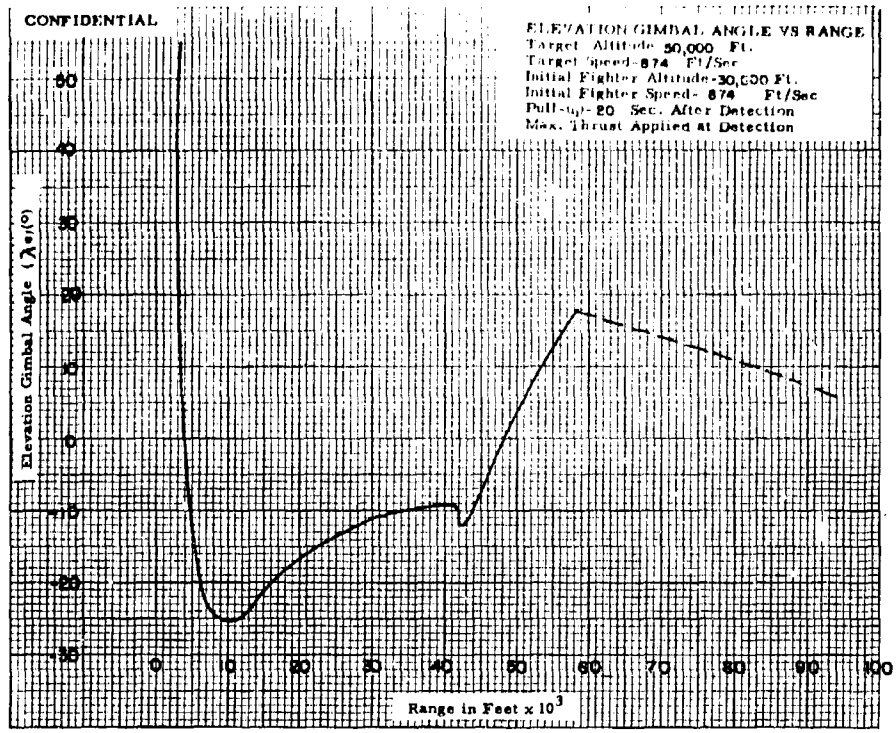
CONFIDENTIAL





CONFIDENTIAL

Figure 538


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed-874 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Gimbal Angle (λe)(°)
Range in Feet x 10^3

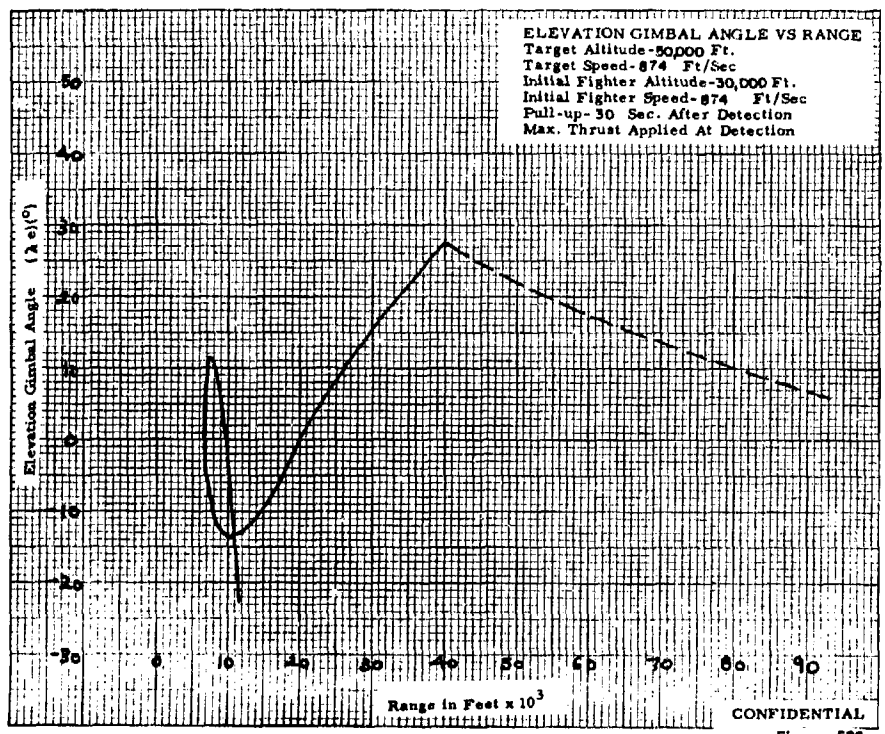
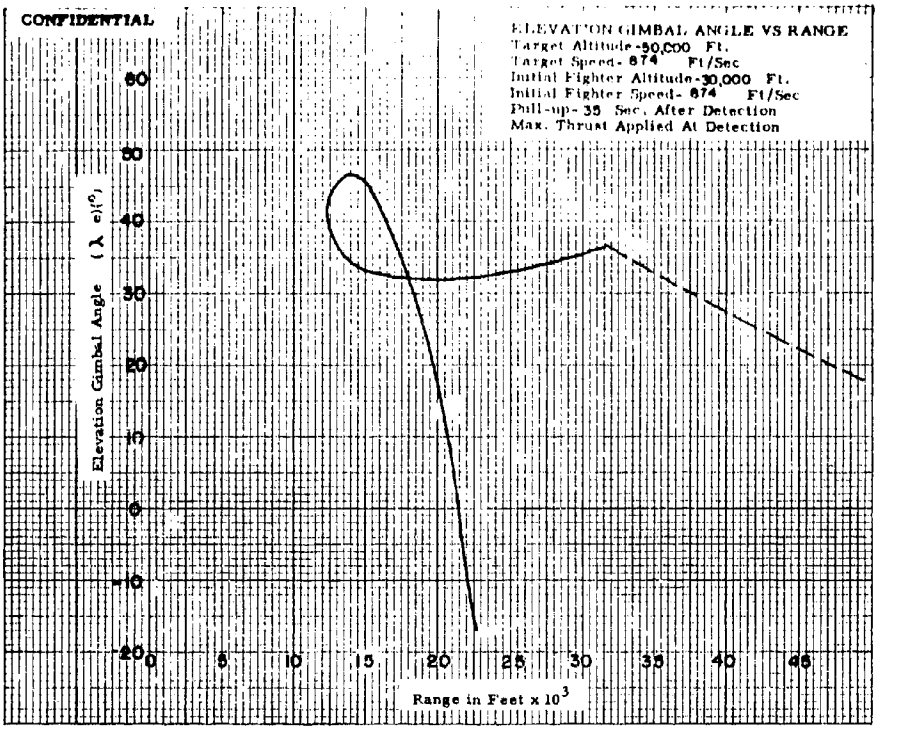

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed-874 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed-874 Ft/Sec
Pull-up-30 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
Range in Feet x 10^3

Figure 539


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 35 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λ e)(°)
60
50
40
30
20
10
0
-10
-20
0
5
10
15
20
25
30
35
40
45
Range in Feet x 10^3

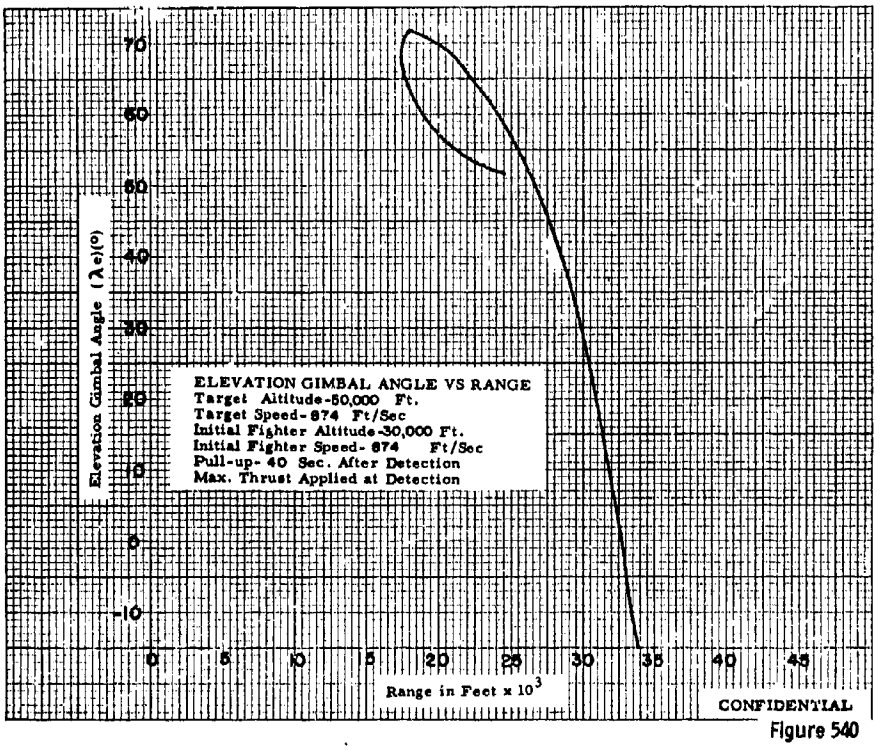
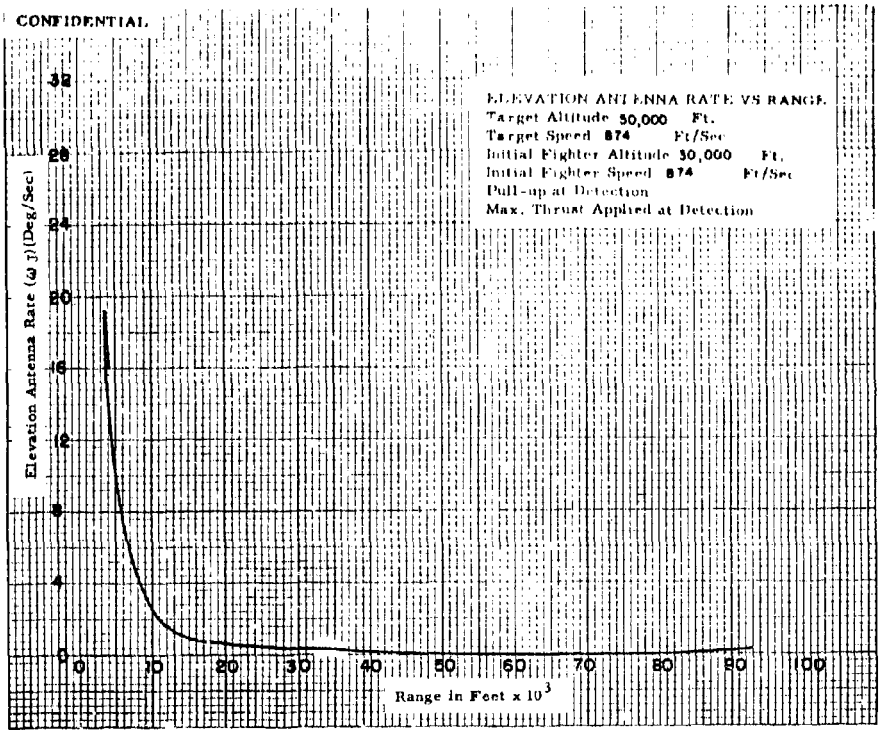

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 40 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Gimbal Angle (λ e)(°)
70
60
50
40
30
20
10
0
-10
0
5
10
15
20
25
30
35
40
45
Range in Feet x 10^3

Figure 540


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_3)(Deg/Sec)
32
28
24
20
16
12
8
4
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

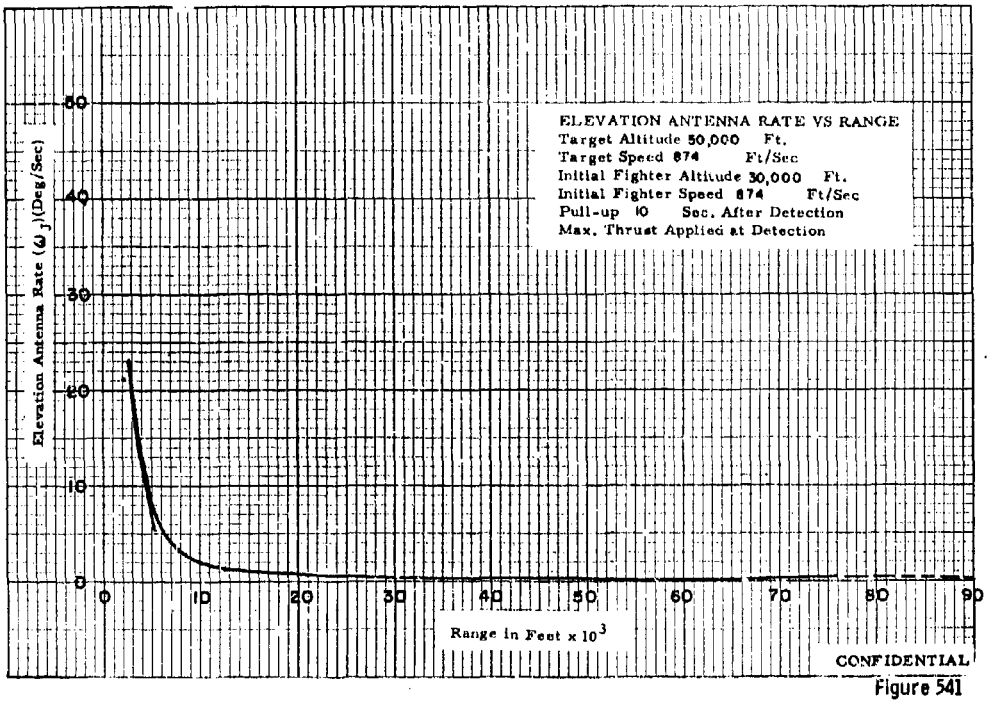
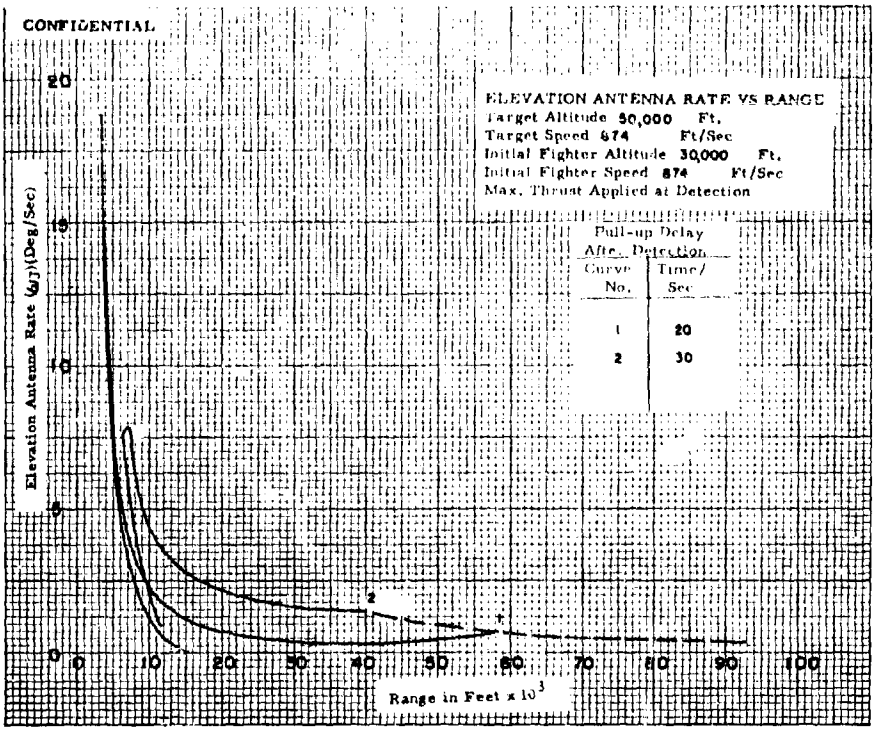
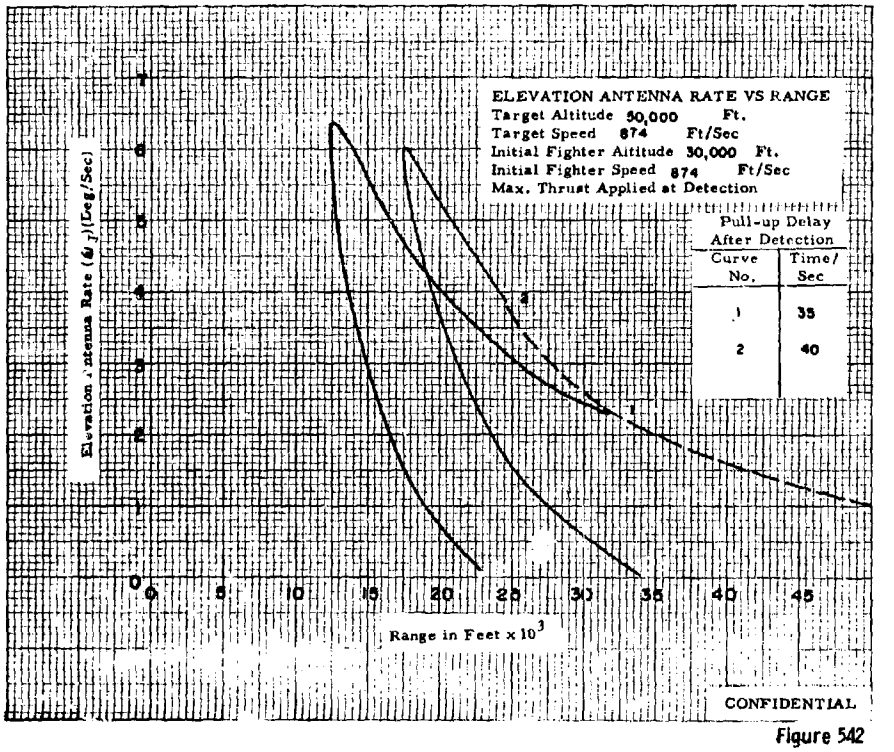

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_3)(Deg/Sec)
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3

Figure 541

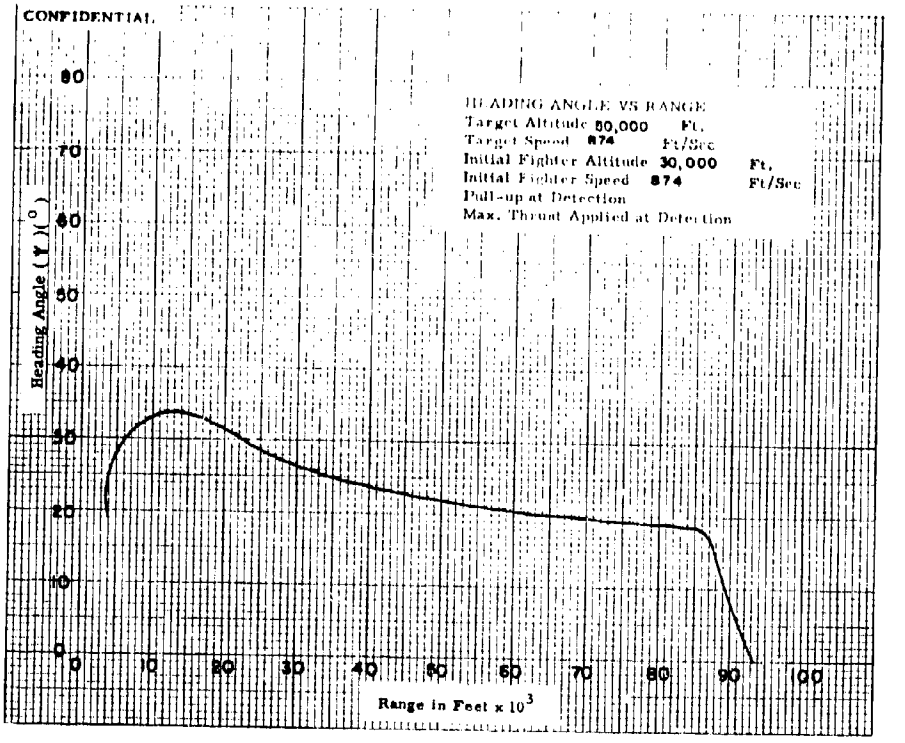
CONFIDENTIAL





CONFIDENTIAL

Figure 542


HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Heading Angle (Ψ)(°)
Range in Feet x 10³

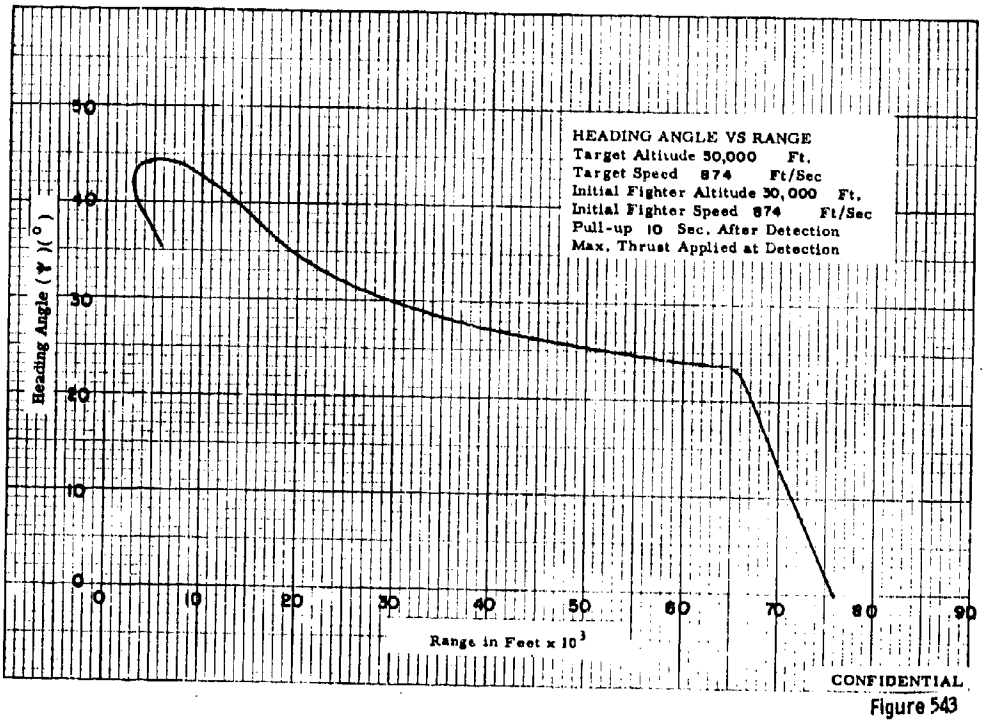
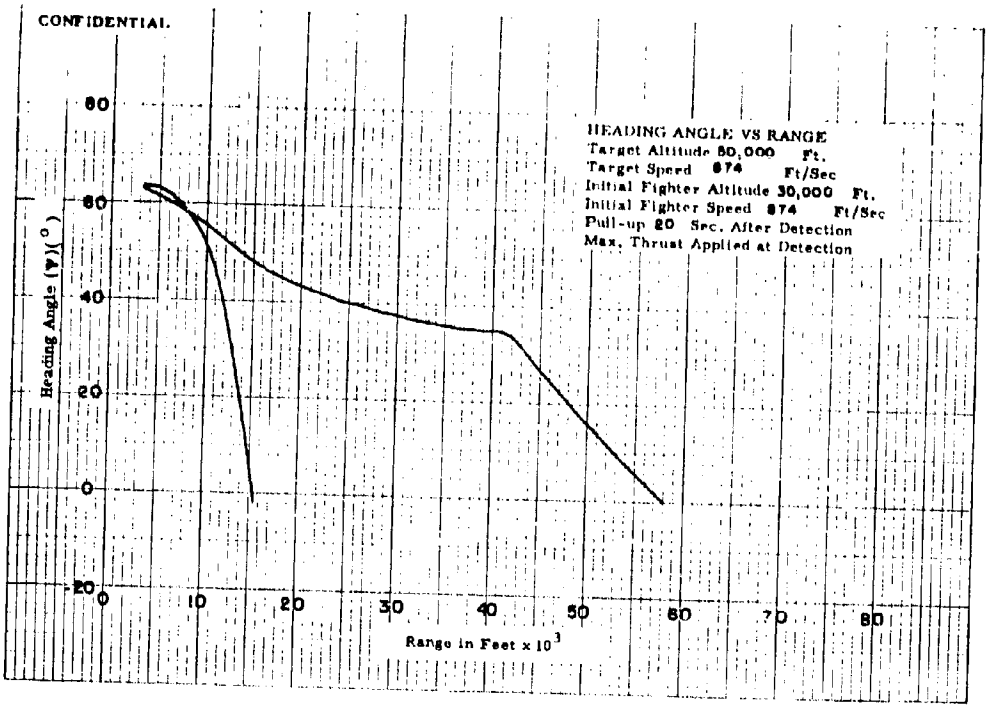
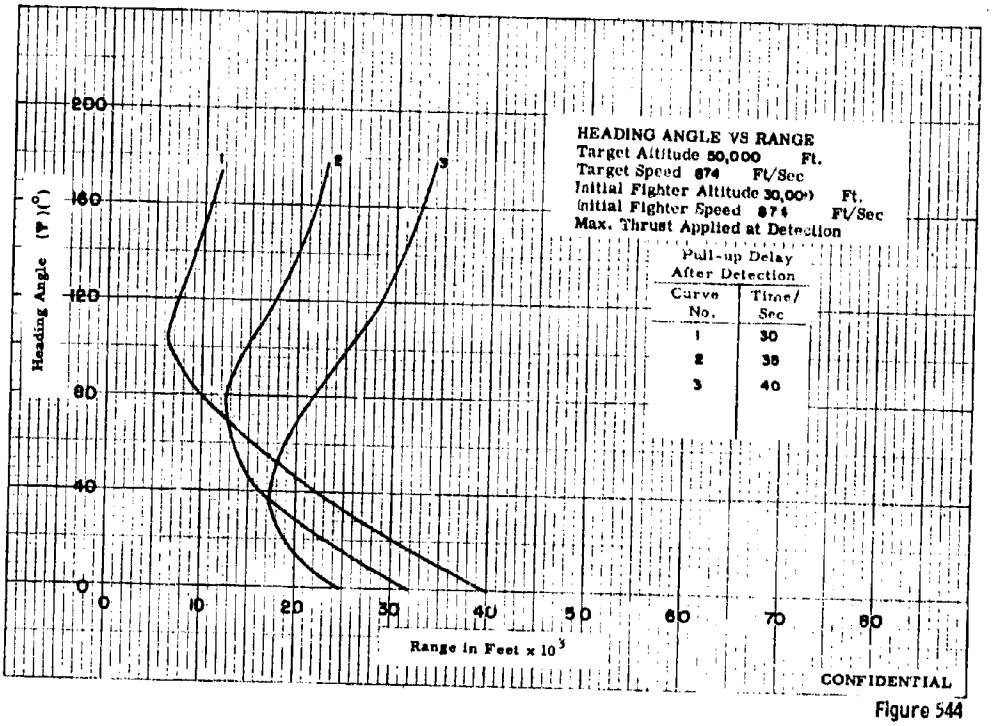

HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Heading Angle (Ψ)(°)
Range in Feet x 10³

Figure 543

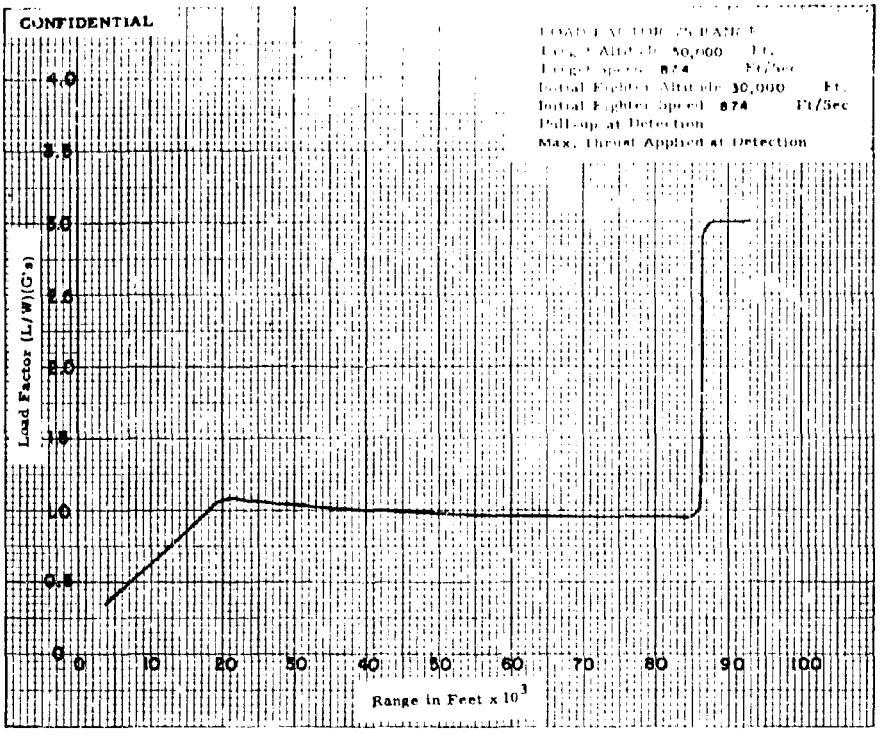
CONFIDENTIAL.





CONFIDENTIAL

Figure 544


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

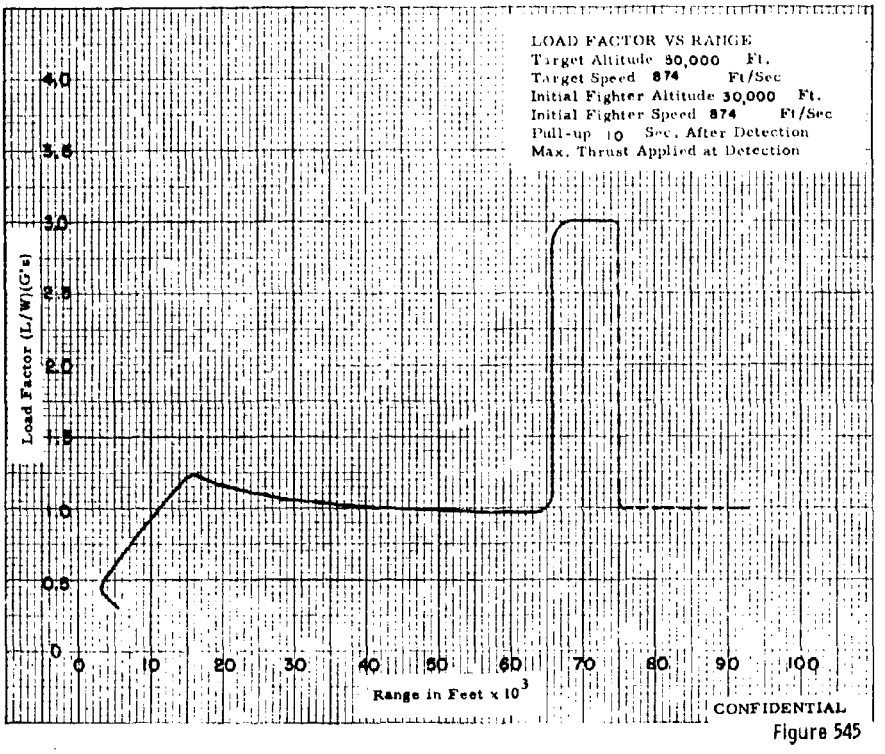
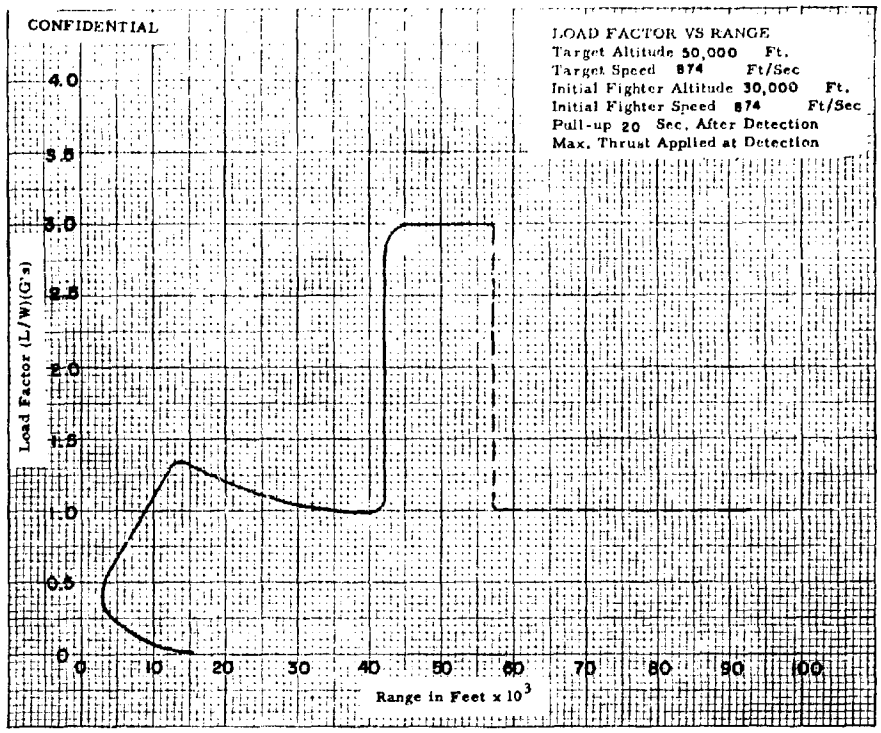

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 545


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

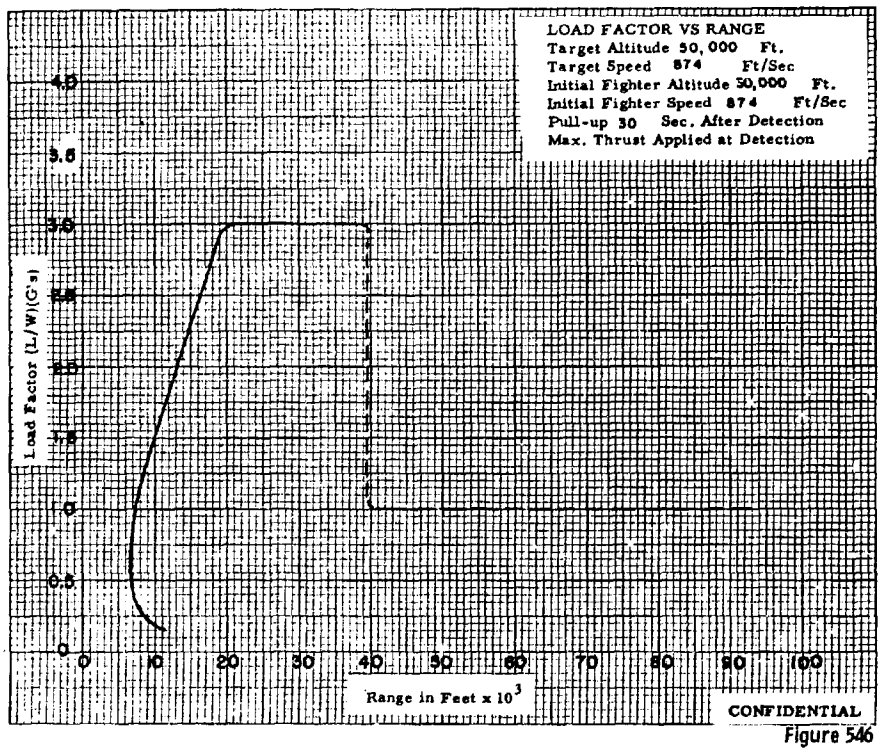
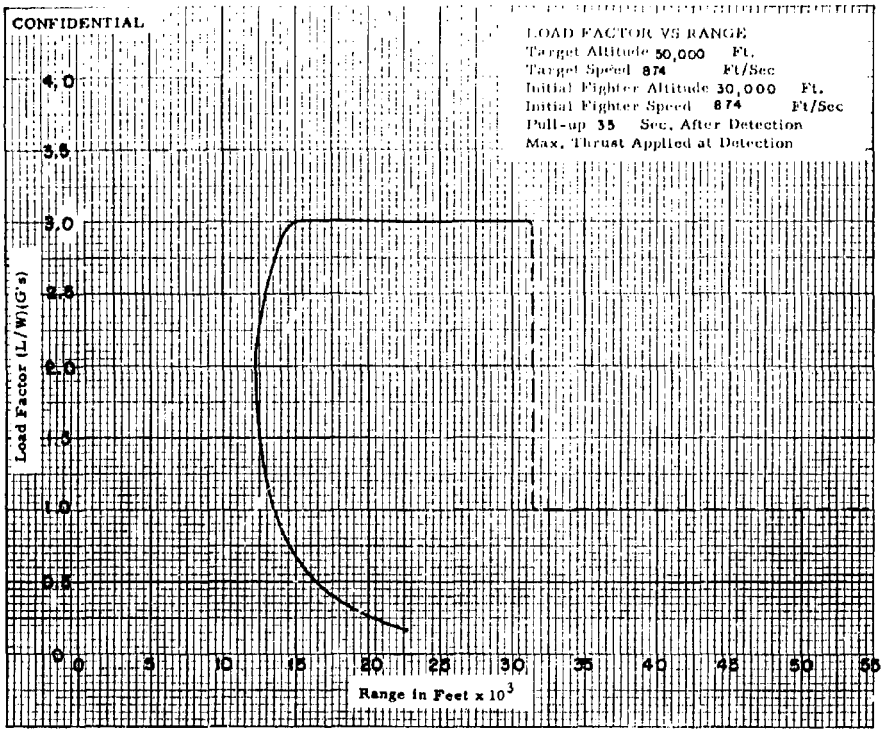

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 546


LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 5 10 15 20 25 30 35 40 45 50 55
Range in Feet x 10^3

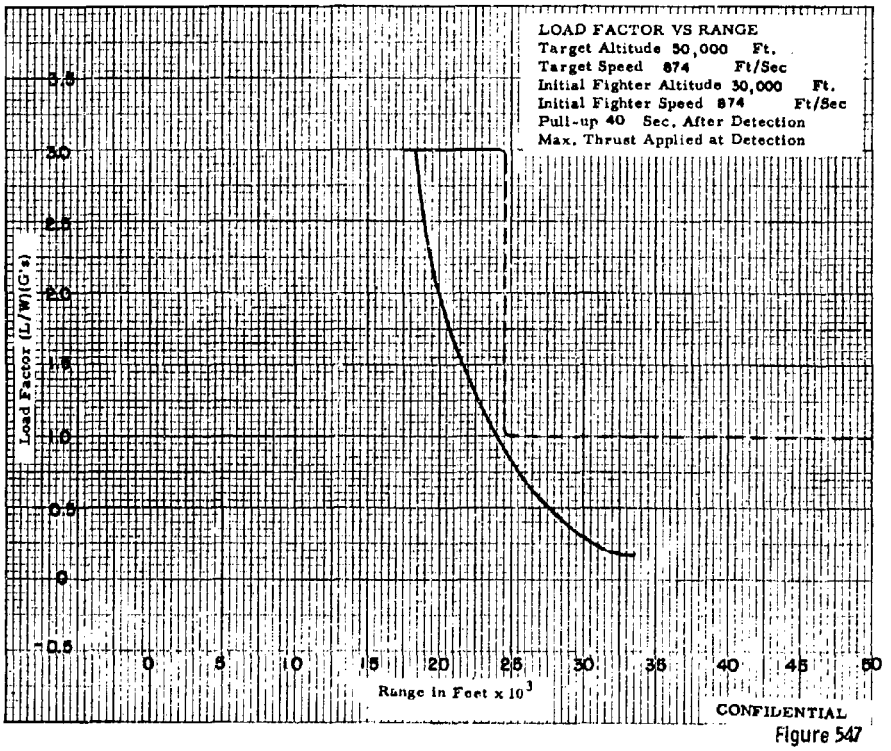
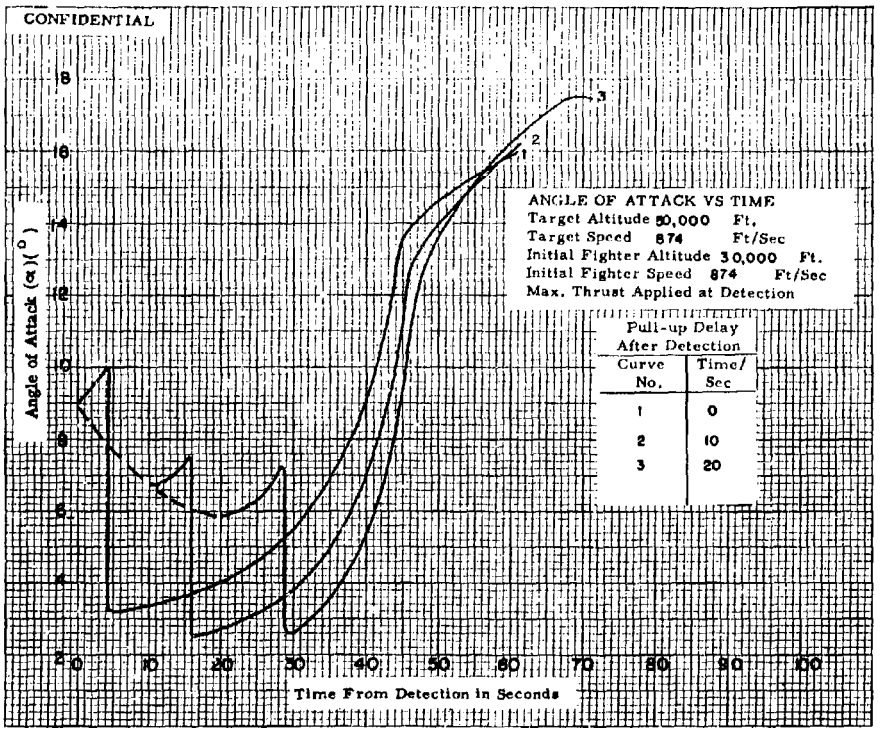
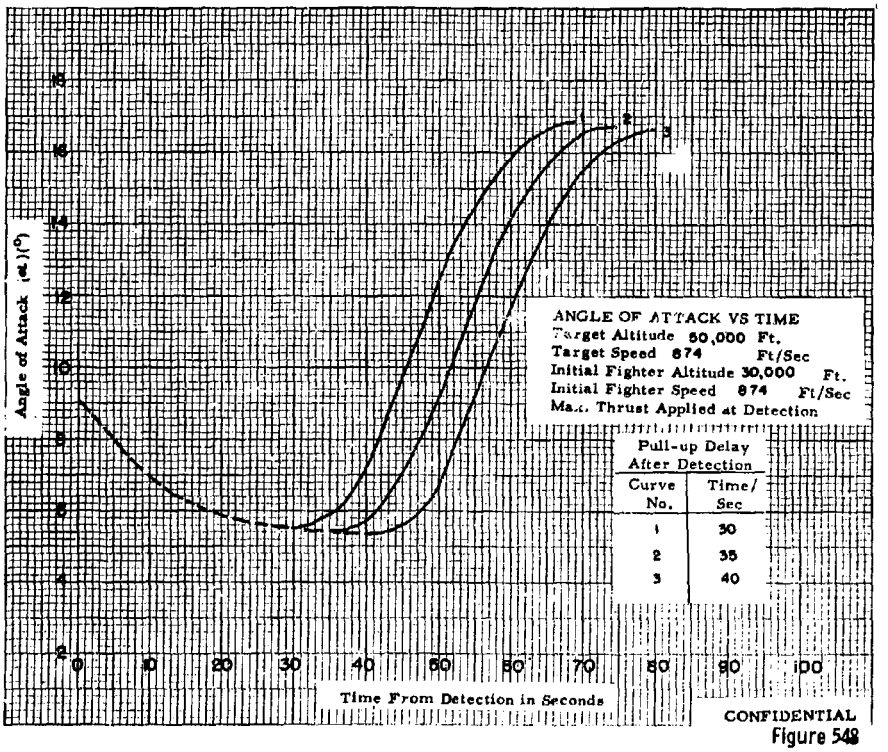

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 40 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
0 5 10 15 20 25 30 35 40 45 50
Range in Feet x 10^3

Figure 547

CONFIDENTIAL

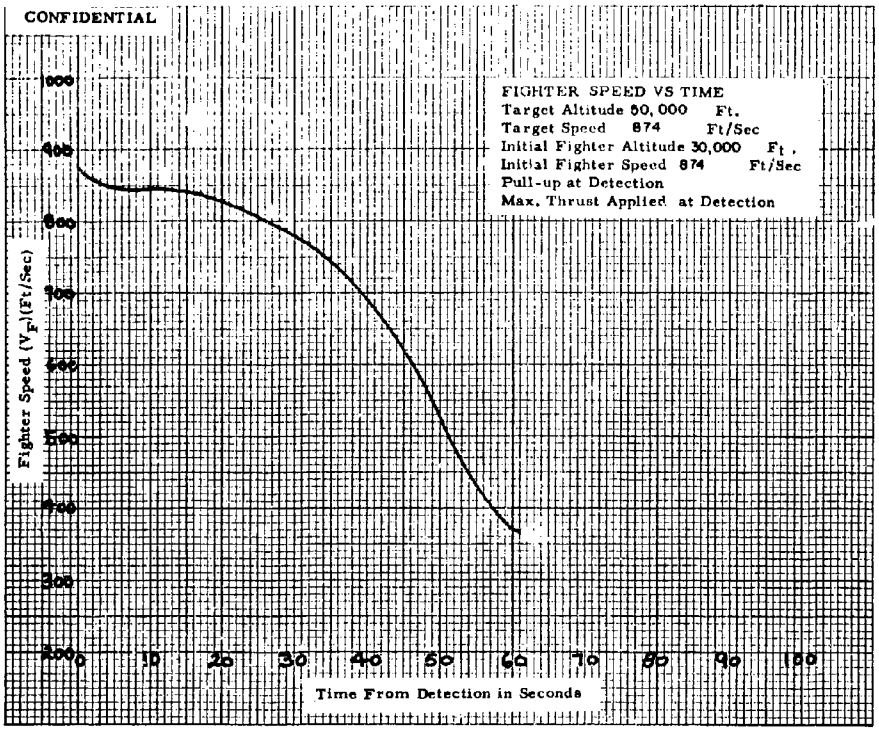


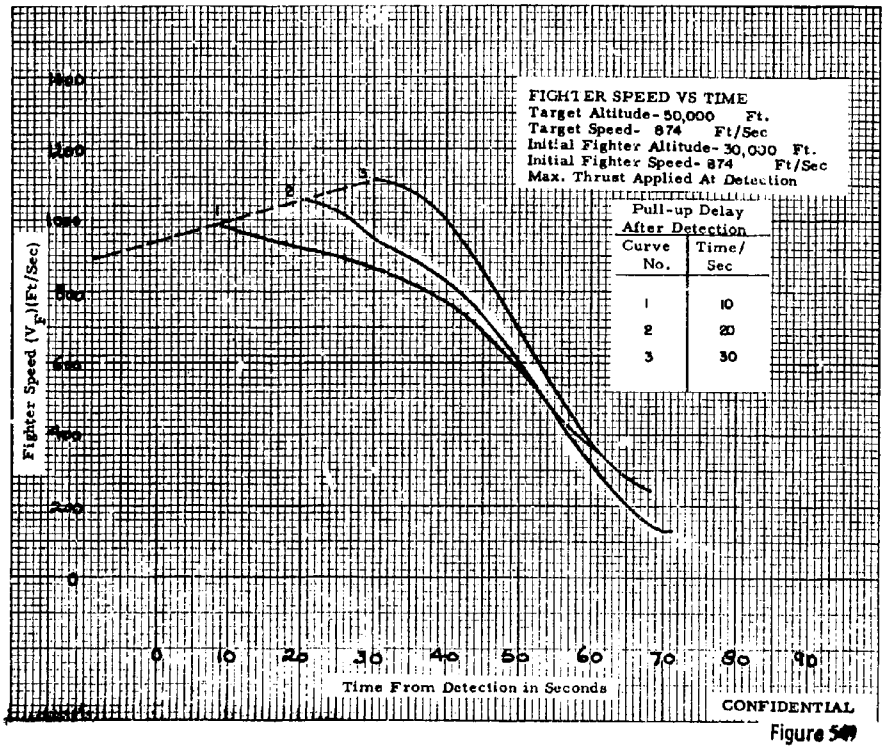


CONFIDENTIAL

Figure 548

CONFIDENTIAL





CONFIDENTIAL

Figure 549

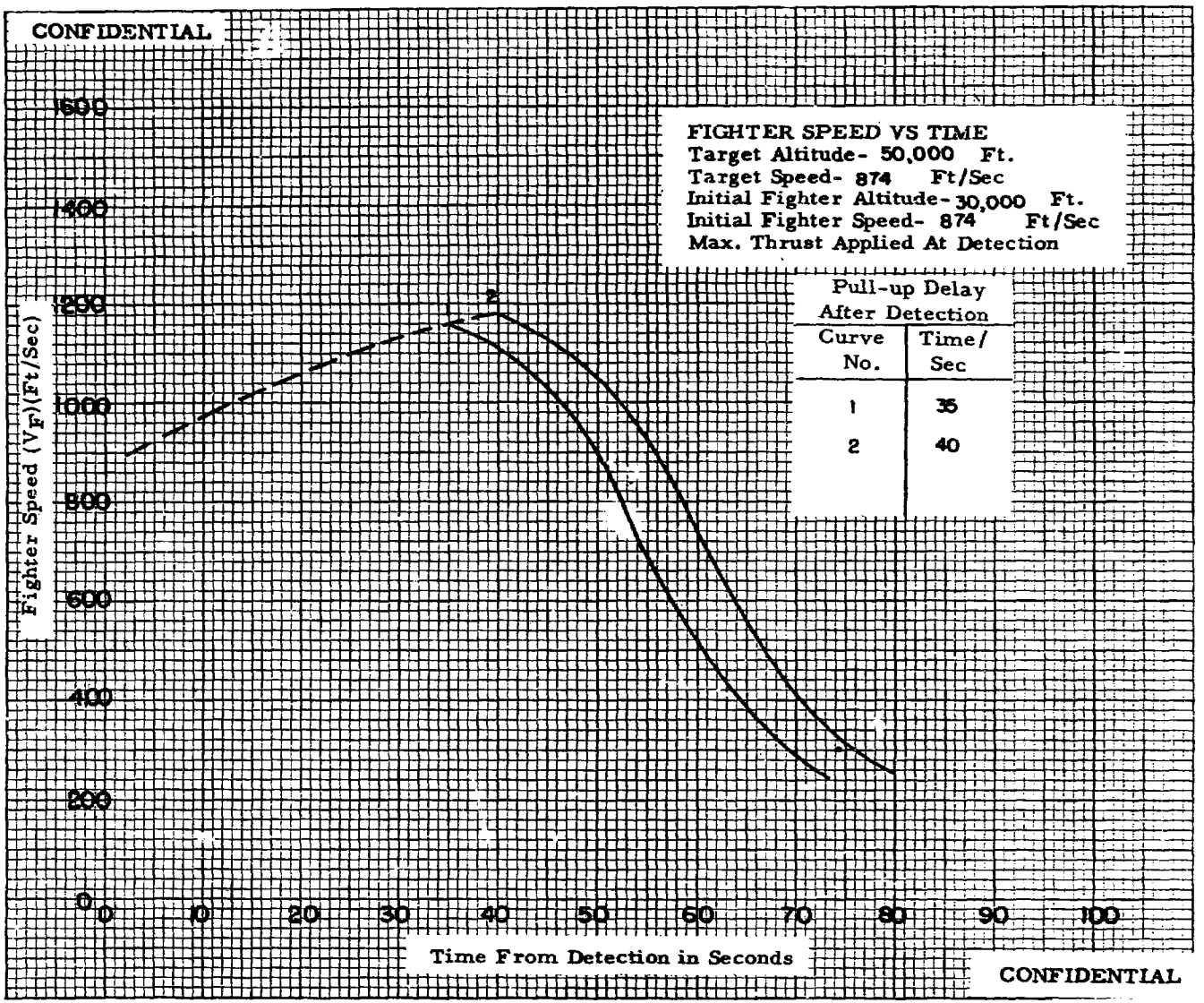
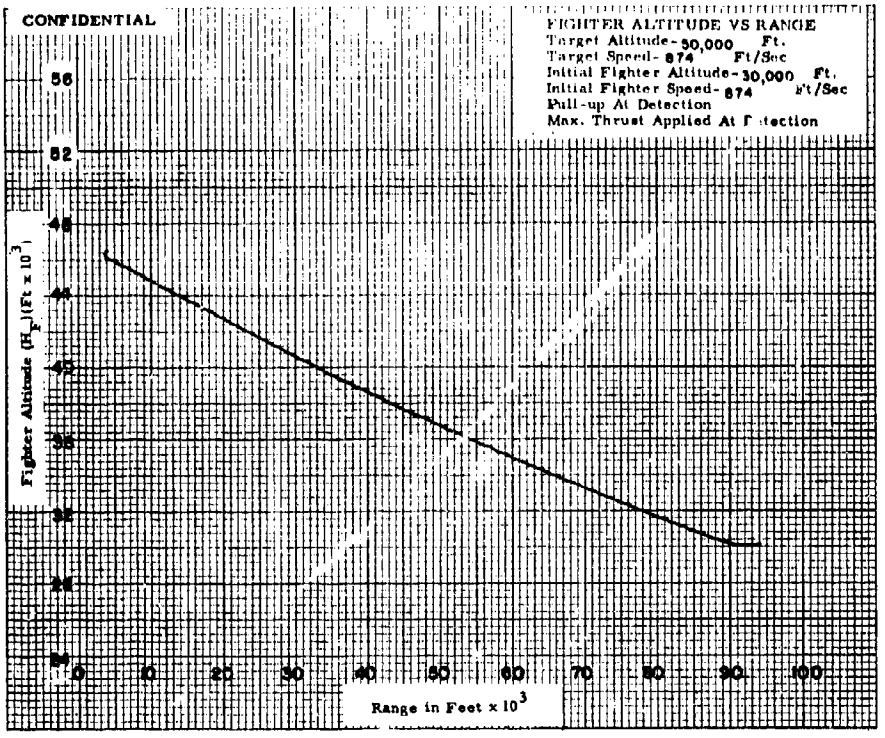

CONFIDENTIAL
FIGHTER SPEED VS TIME
Target Altitude- 50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude- 30,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 35
2 | 40
Fighter Speed (V_F)(Ft/Sec)
1600
1400
1200
1000
800
600
400
200
0
0 10 20 30 40 50 60 70 80 90 100
Time From Detection in Seconds
CONFIDENTIAL

Figure 550


FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up At Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
56
52
48
44
40
36
32
28
24
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

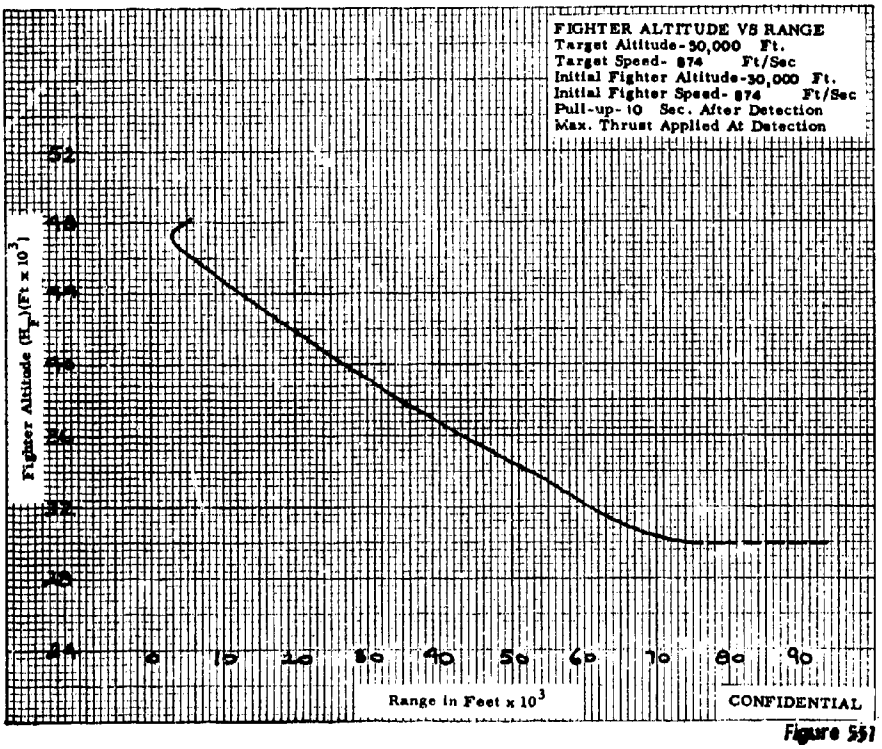
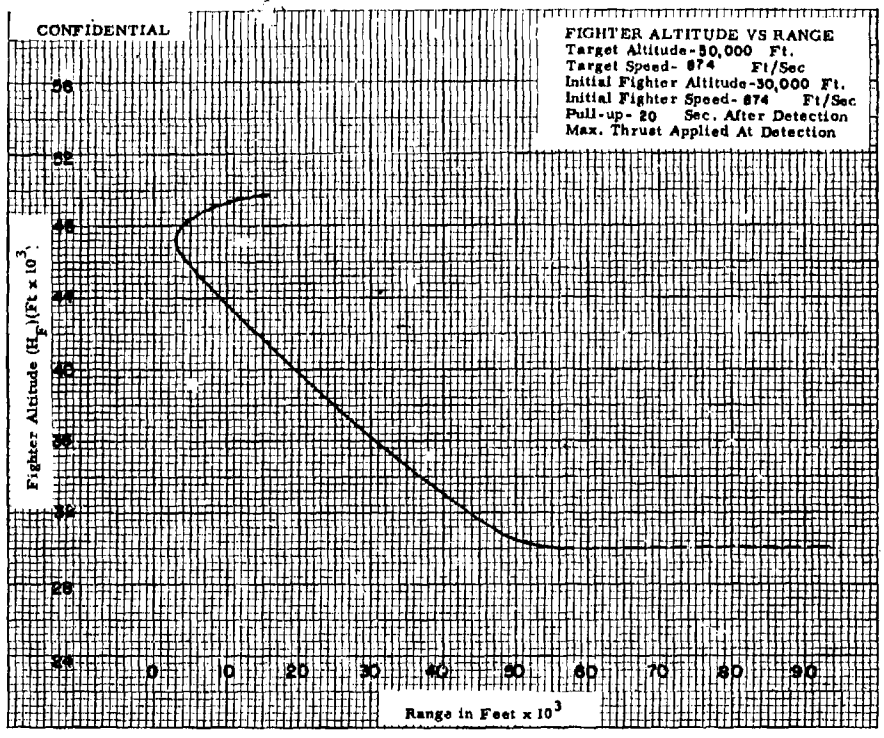
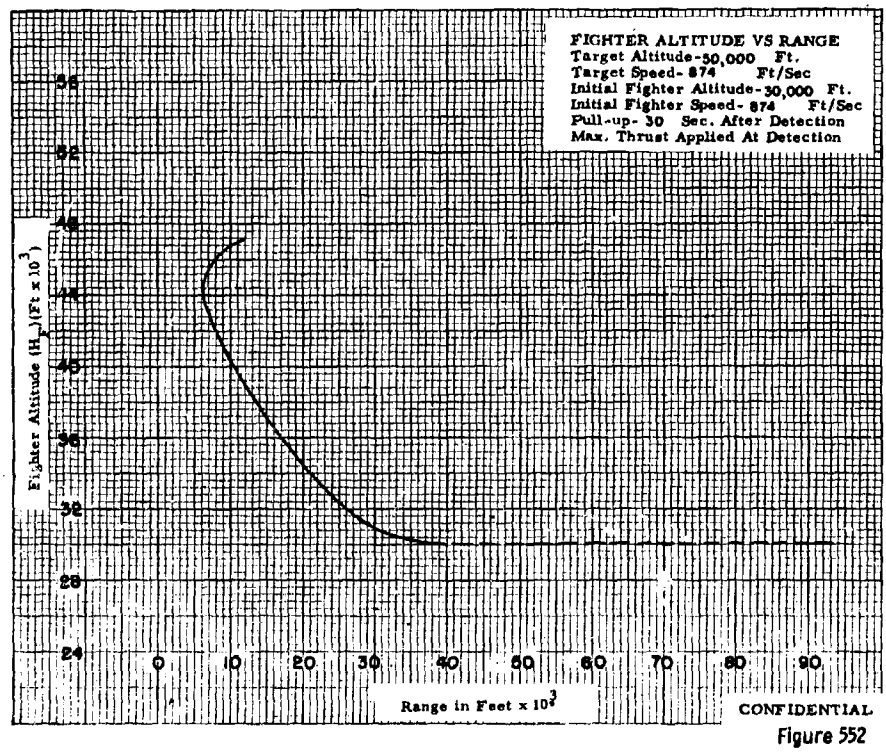

FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
52
48
44
40
36
32
28
24
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3
CONFIDENTIAL

Figure 551

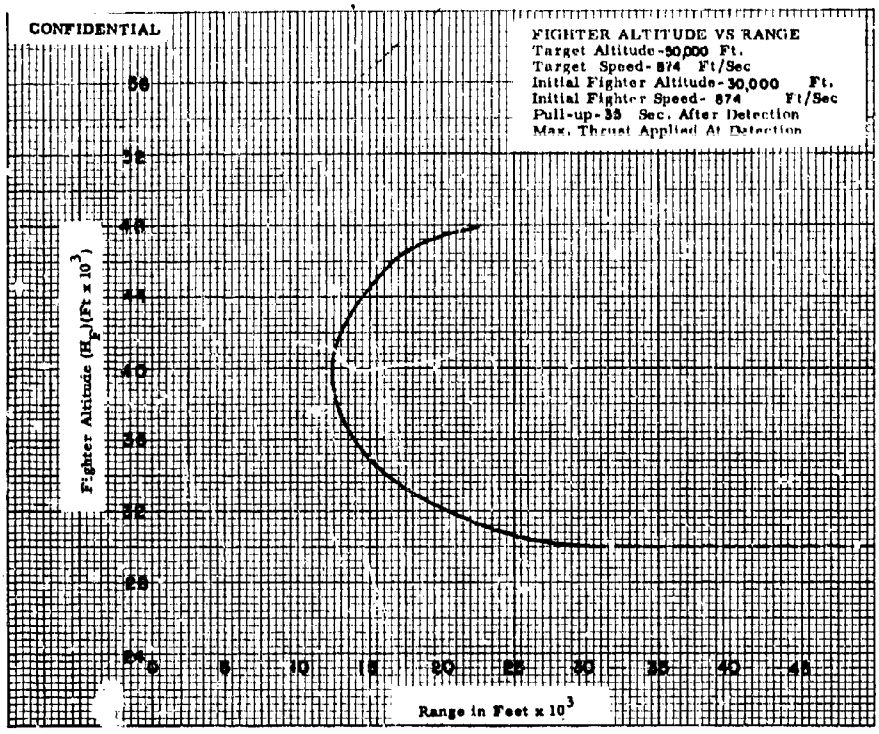
CONFIDENTIAL





CONFIDENTIAL

Figure 552


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-30,000 Ft.
Target Speed-874 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed-874 Ft/Sec
Pull-up-35 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3

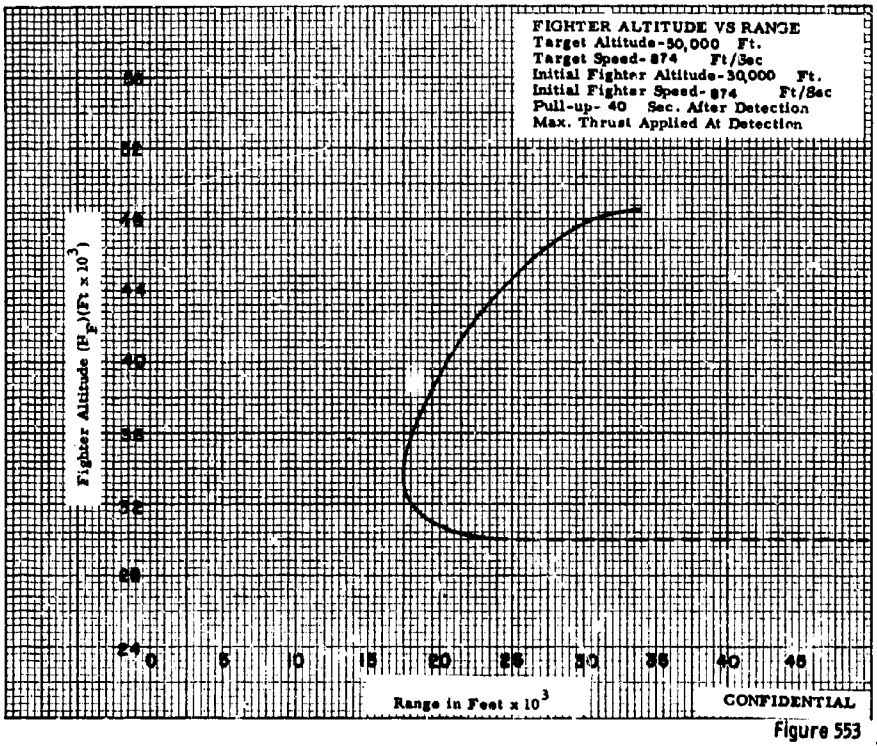
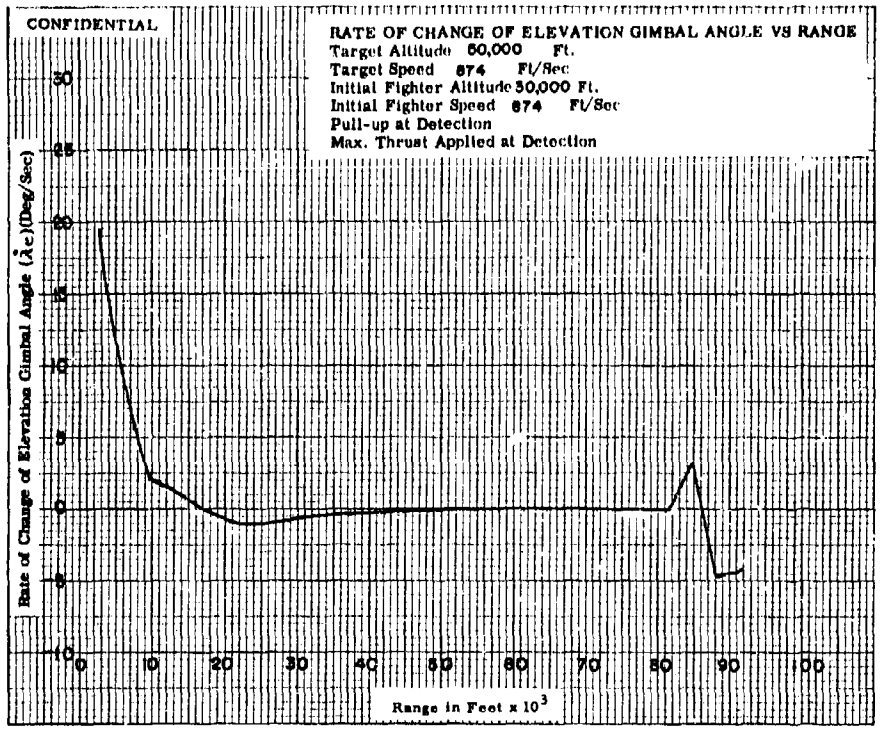

FIGHTER ALTITUDE VS RANGE
Target Altitude-30,000 Ft.
Target Speed-874 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed-874 Ft/Sec
Pull-up-40 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3
CONFIDENTIAL

Figure 553


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (Ȧe) (Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

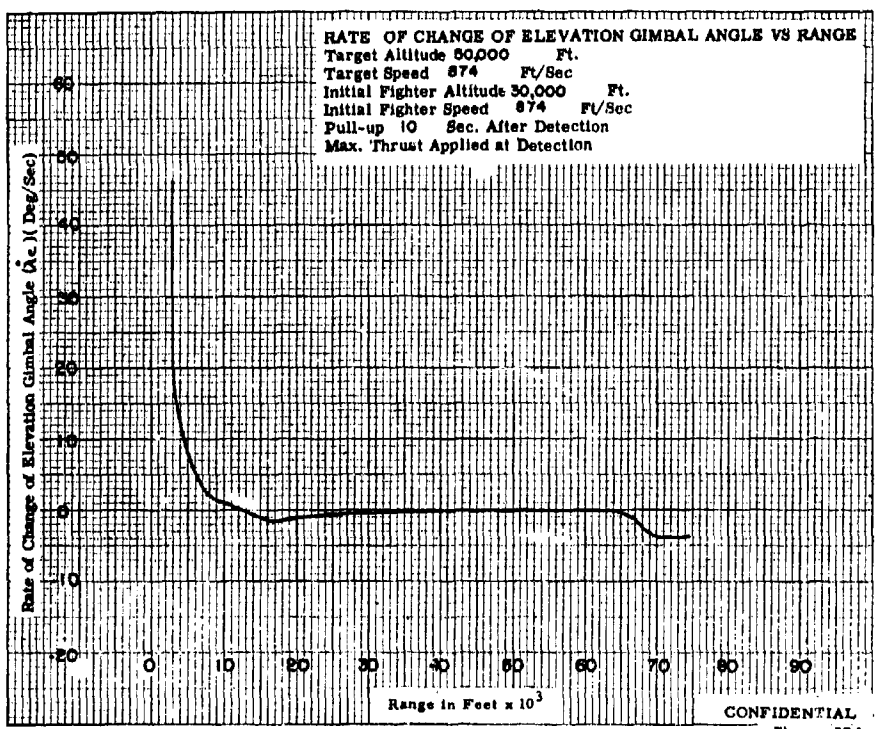
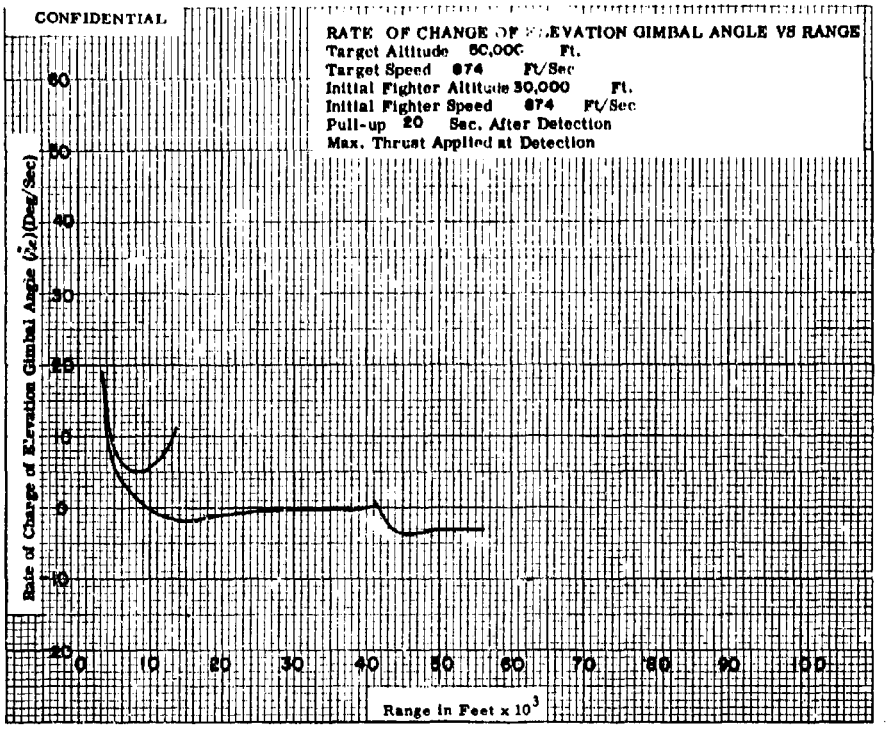

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (Ȧe) (Deg/Sec)
60
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10³
CONFIDENTIAL

Figure 554


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\theta}_E$)(Deg/Sec)
60
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

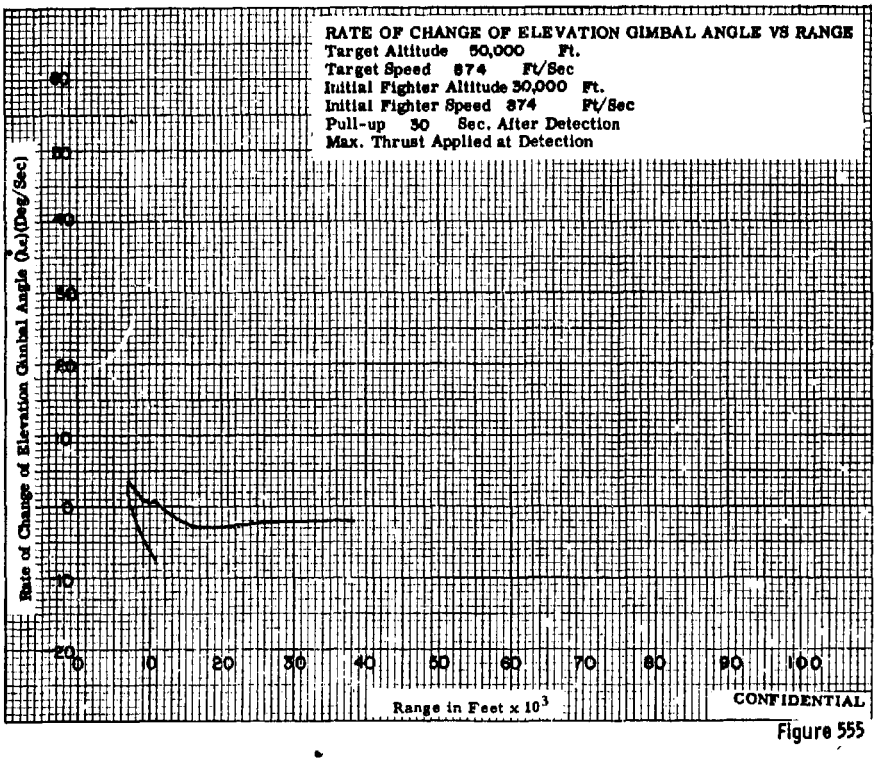
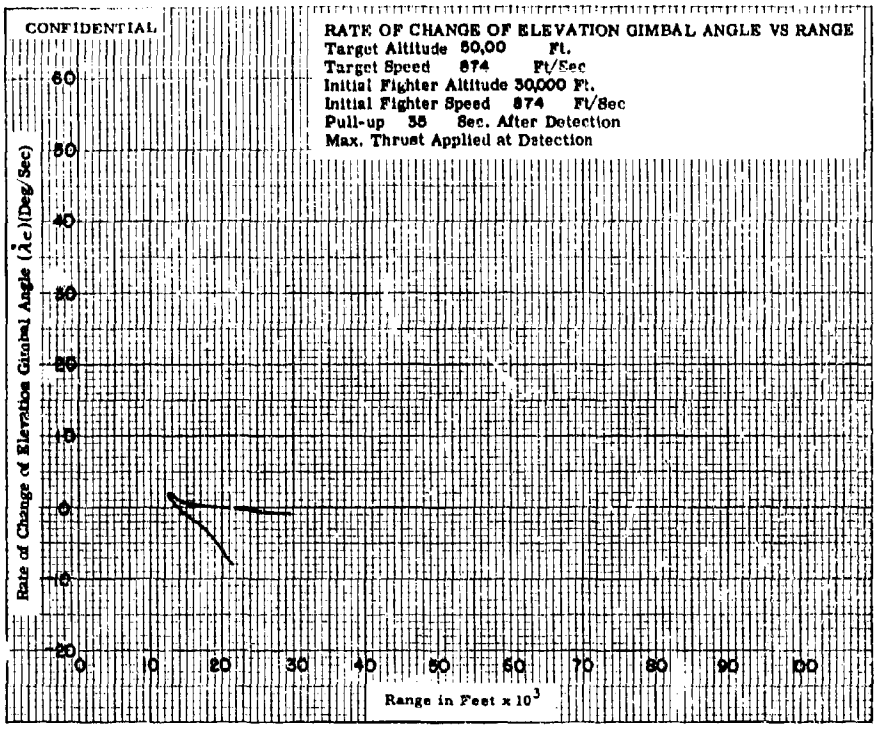
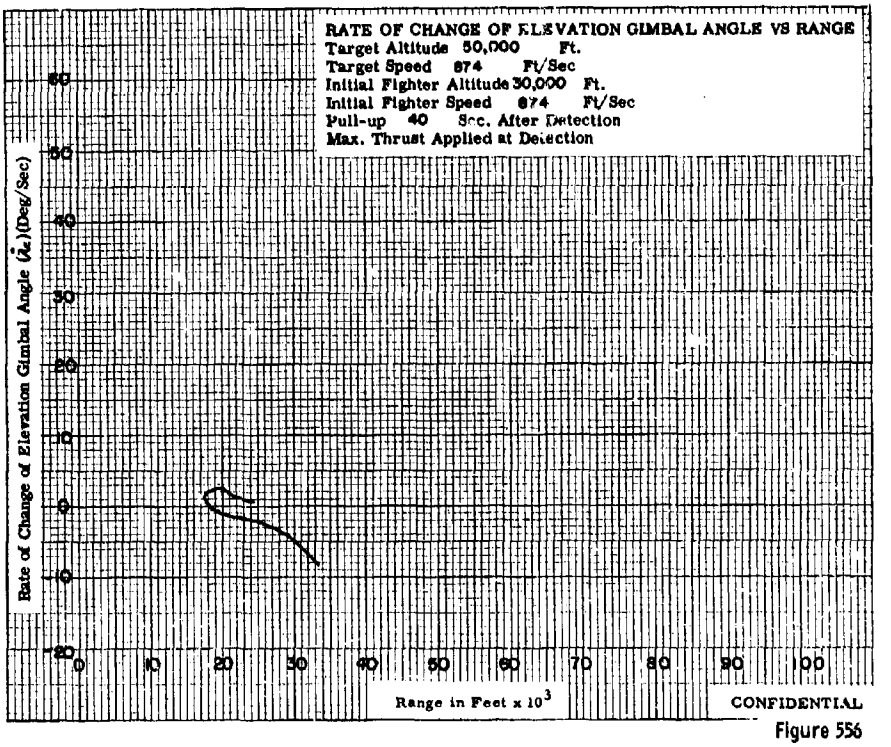

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\theta}_E$)(Deg/Sec)
60
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 555

CONFIDENTIAL





CONFIDENTIAL

Figure 556

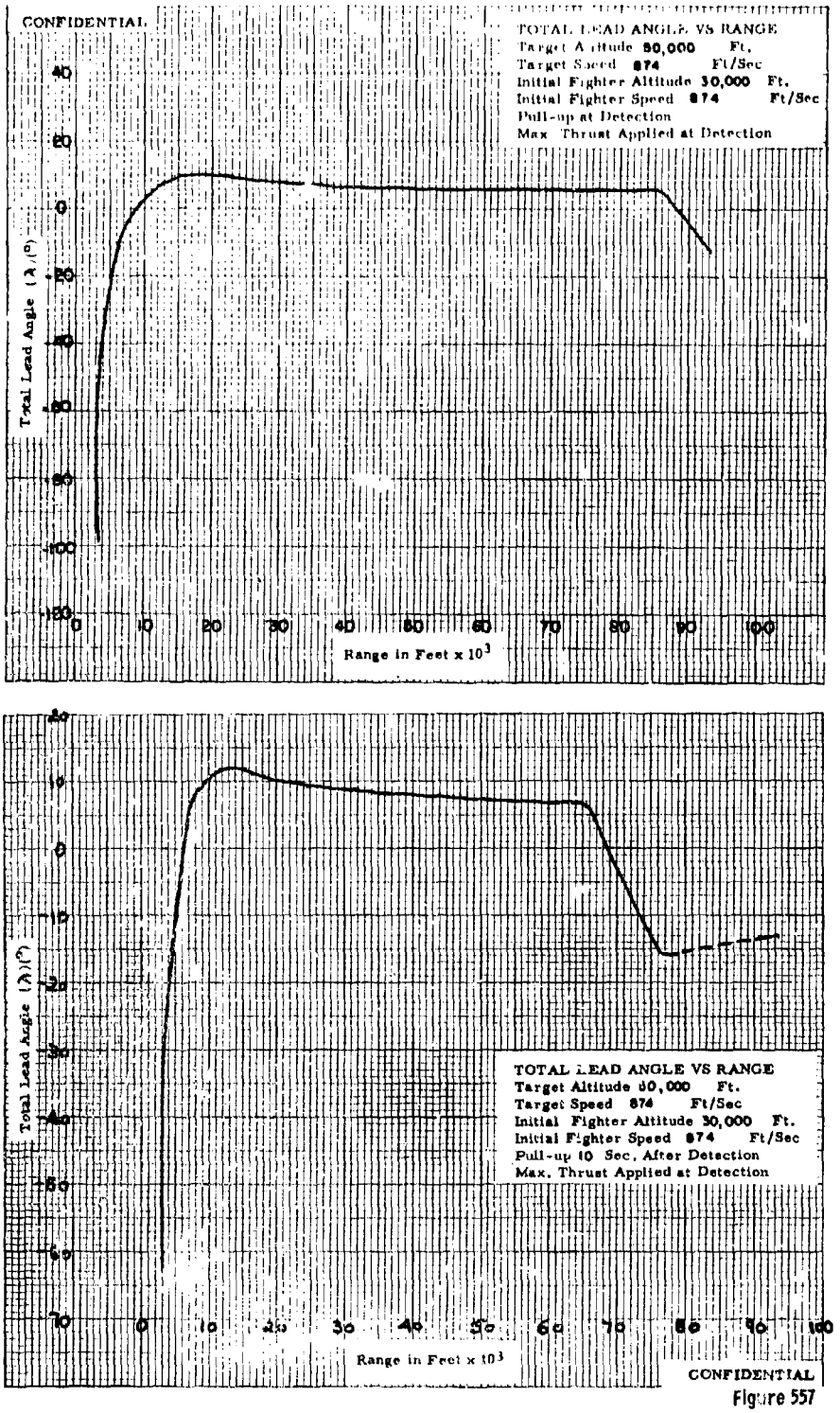
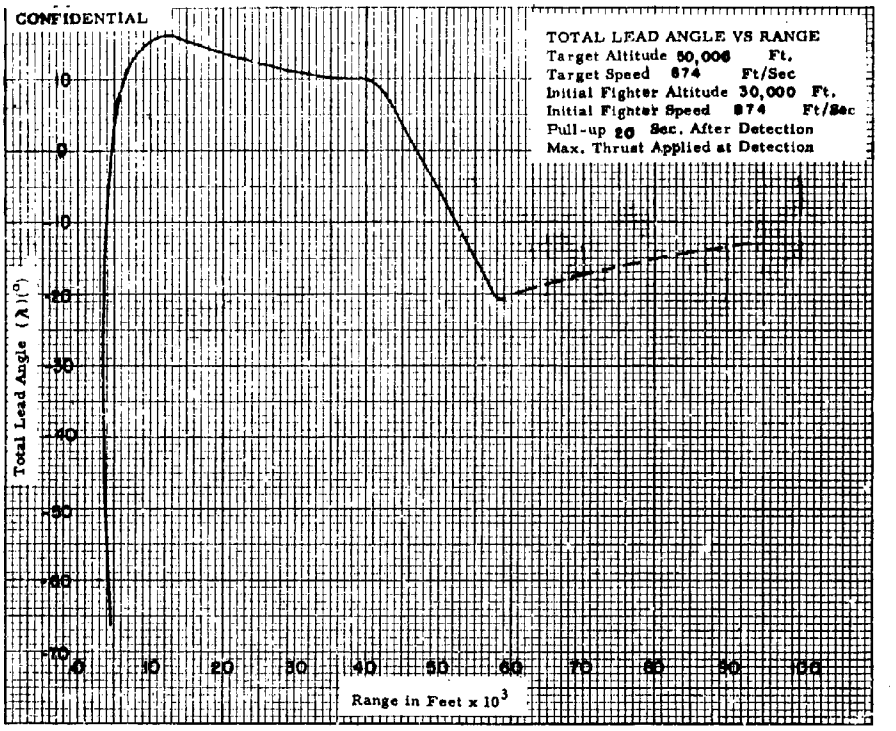

CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max Thrust Applied at Detection
Total Lead Angle (λ)(°)
40
20
0
-20
-40
-60
-80
-100
-120
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
Range in Feet x 10³
CONFIDENTIAL

Figure 557


TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
Range in Feet x 10^3

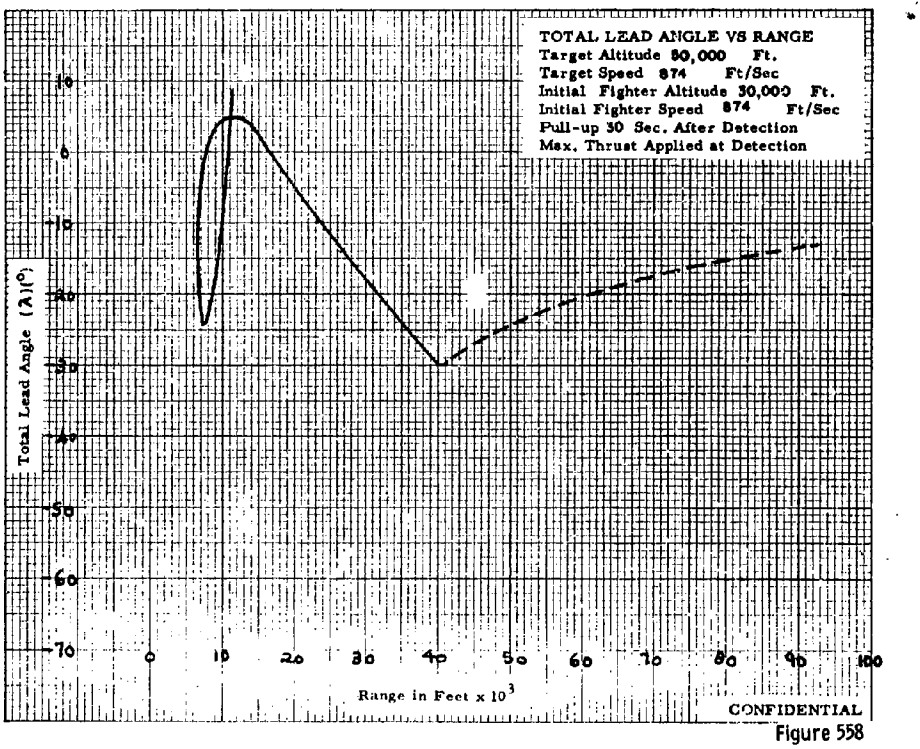

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
Range in Feet x 10^3

Figure 558

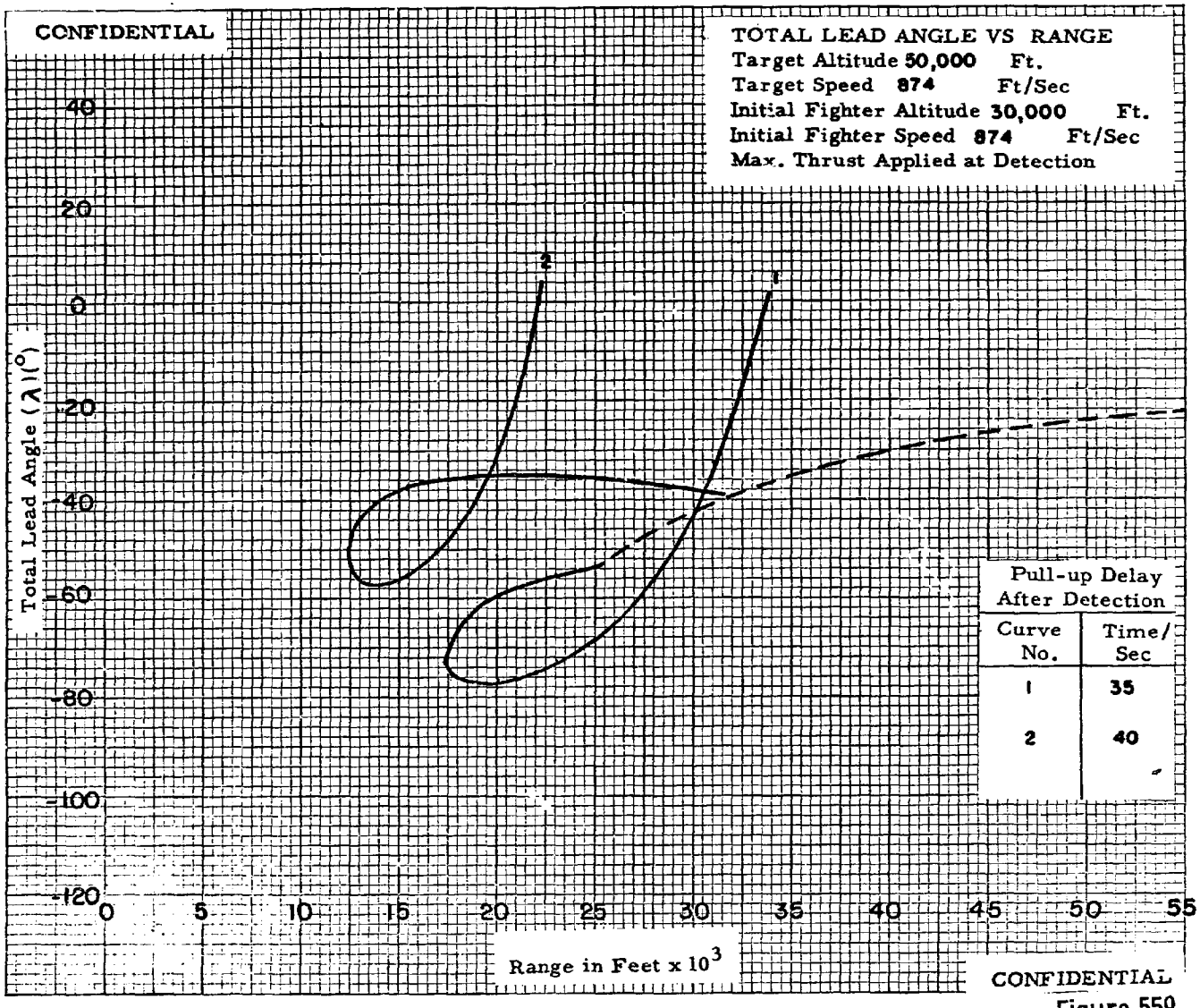
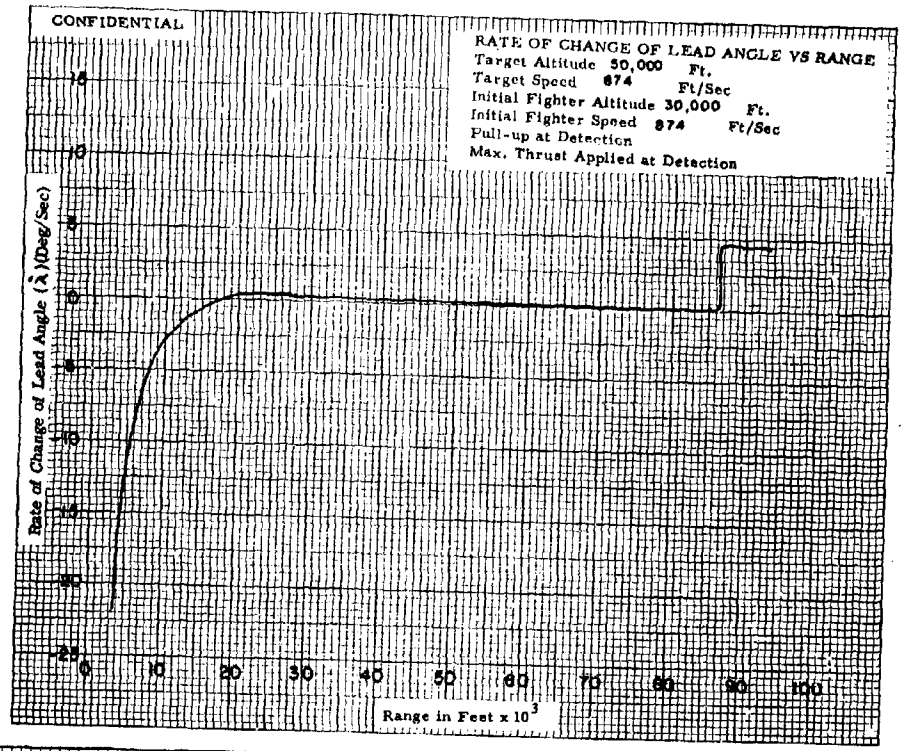

CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Max. Thrust Applied at Detection
Total Lead Angle (λ1(°)
40
20
0
-20
-40
-60
-80
-100
-120
0
5
10
15
20
25
30
35
40
45
50
55
Range in Feet x 10^3
1
2
Pull-up Delay After Detection
Curve No.
Time/ Sec
1
35
2
40
CONFIDENTIAL

Figure 559


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
Range in Feet x 10³
0
10
20
30
40
50
60
70
80
90
100

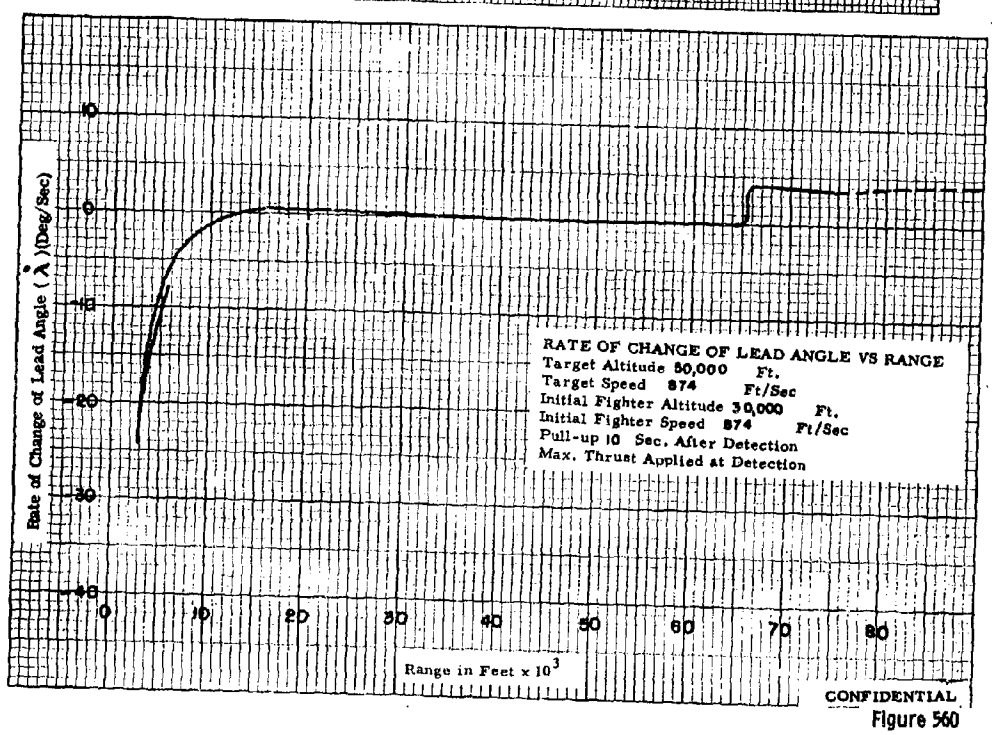
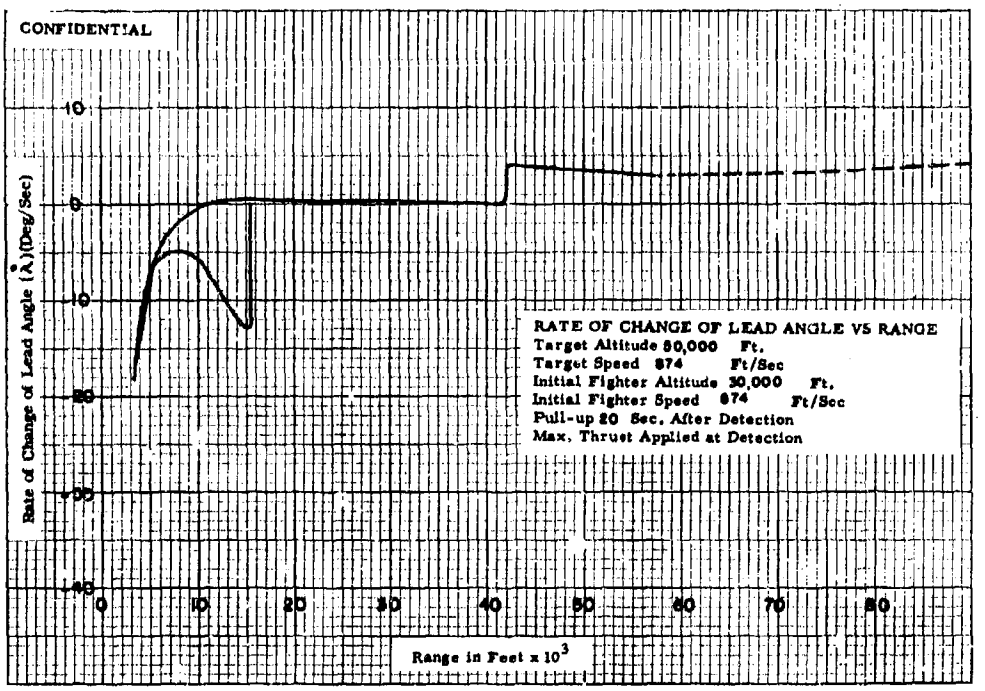

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
Range in Feet x 10³
0
10
20
30
40
50
60
70
80

Figure 560


Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection

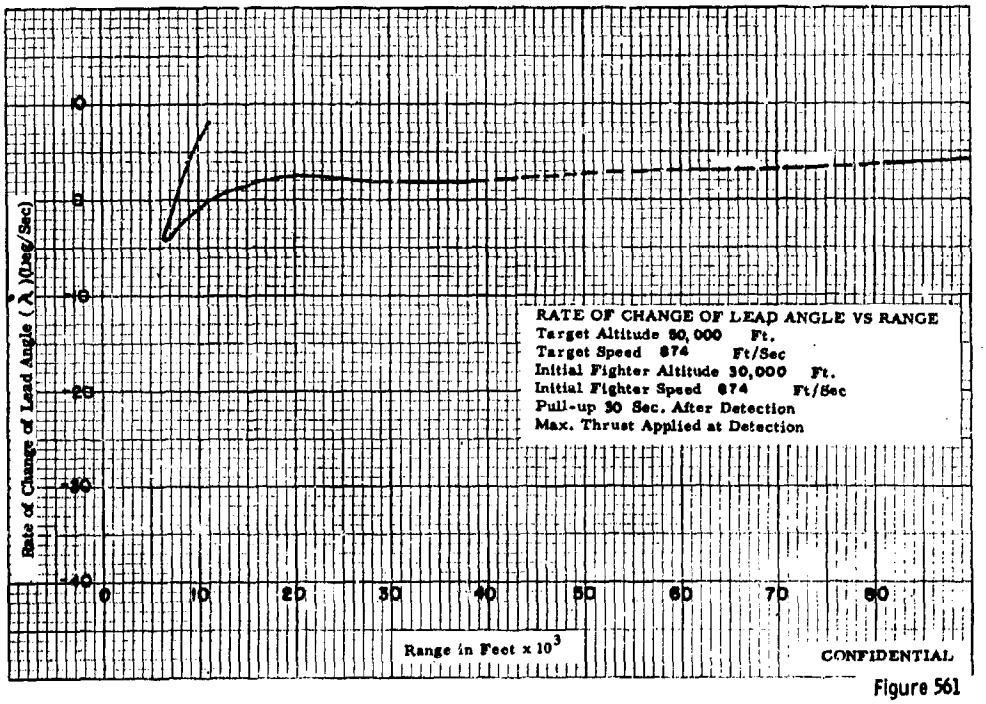
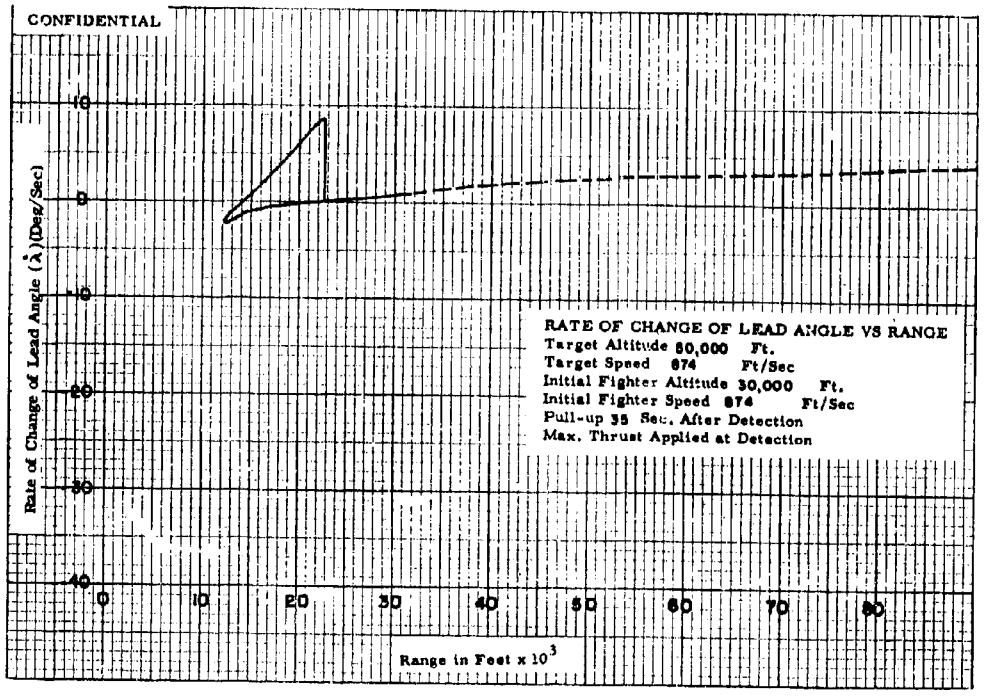
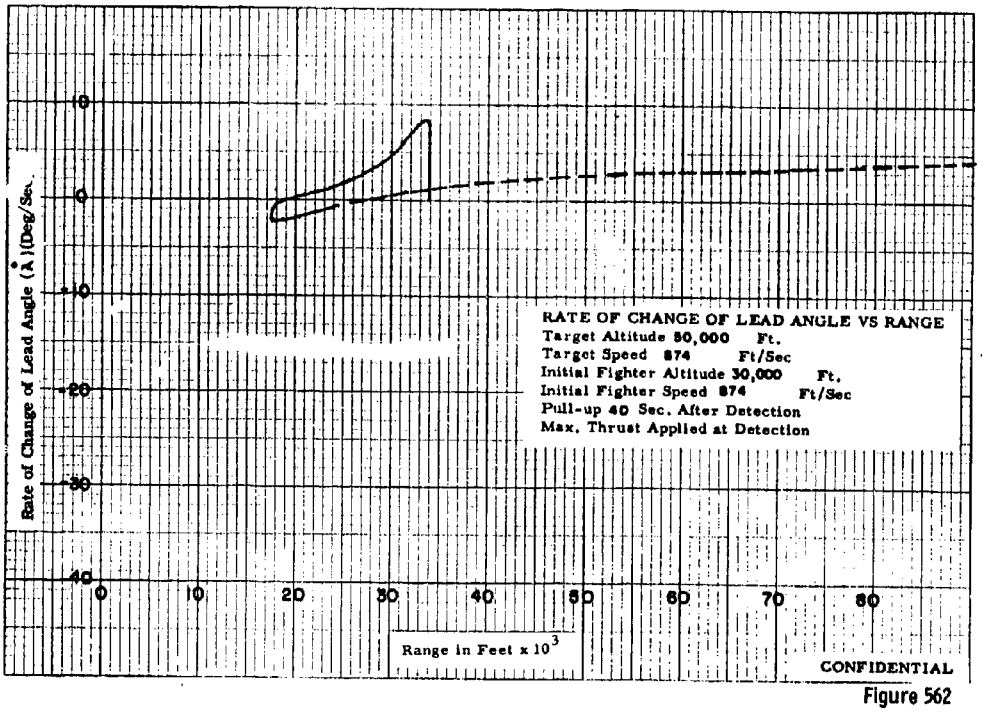

Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
CONFIDENTIAL

Figure 561

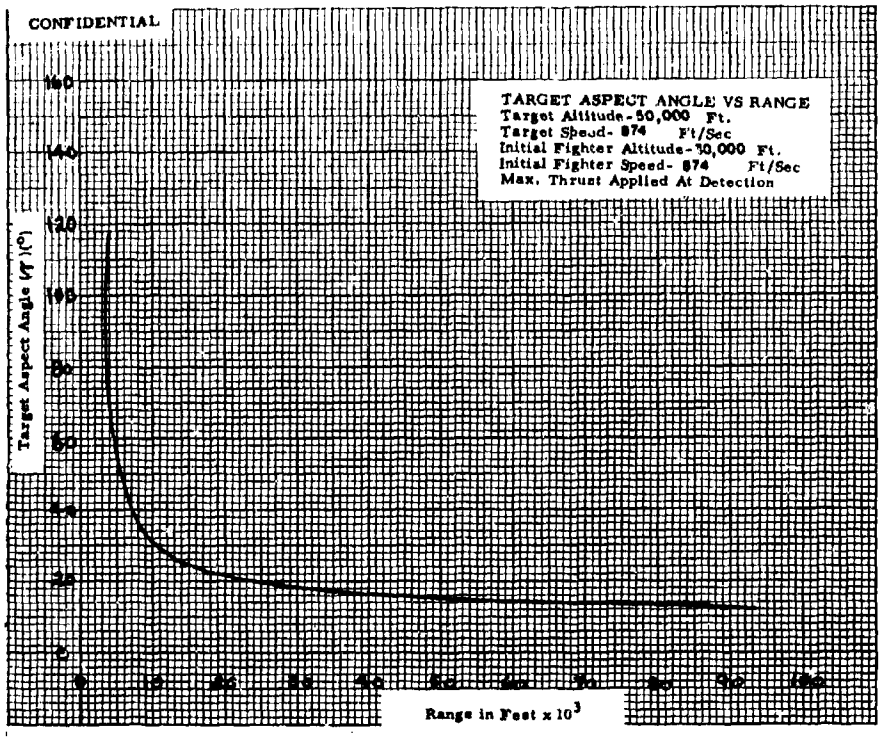
CONFIDENTIAL





CONFIDENTIAL

Figure 562


TARGET ASPECT ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Max. Thrust Applied At Detection
Target Aspect Angle (ψ1)(°)
Range in Feet x 10³

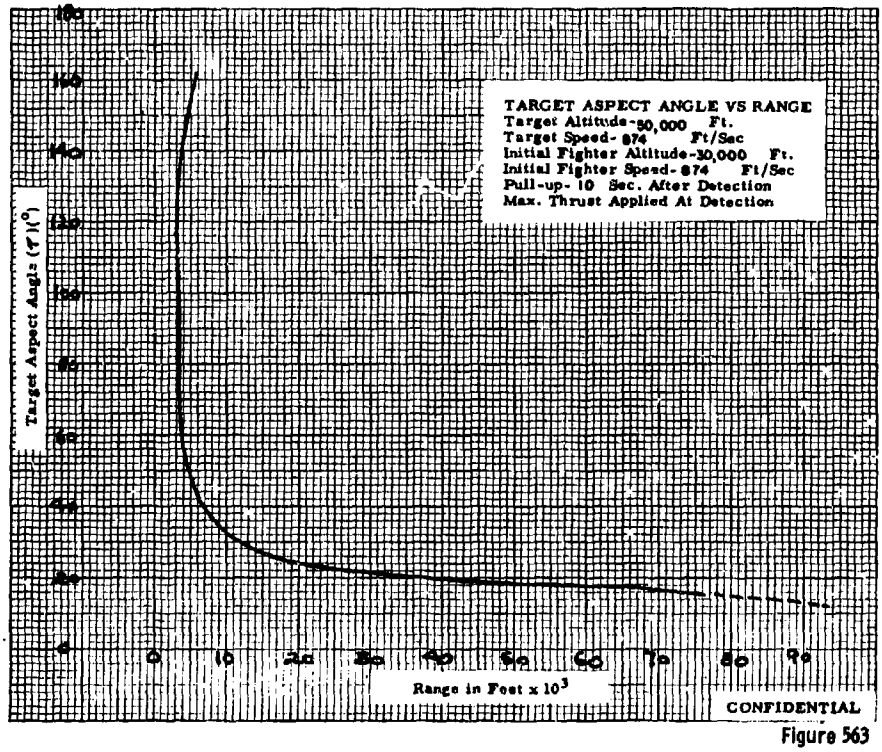
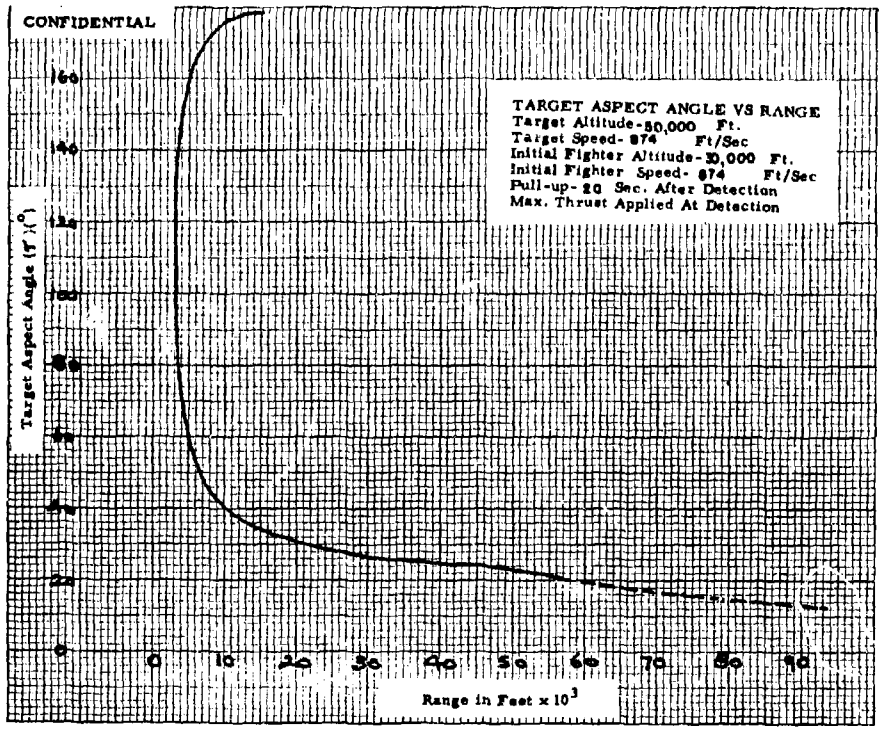

TARGET ASPECT ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ψ1)(°)
Range in Feet x 10³

Figure 563


TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ψ) (°)
Range in Feet x 10³

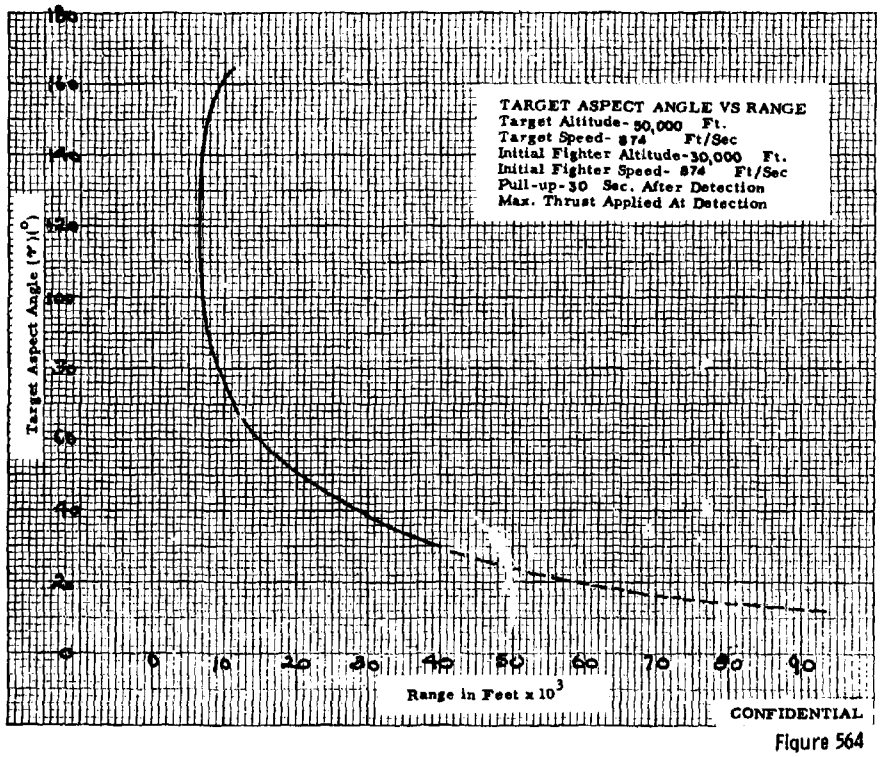
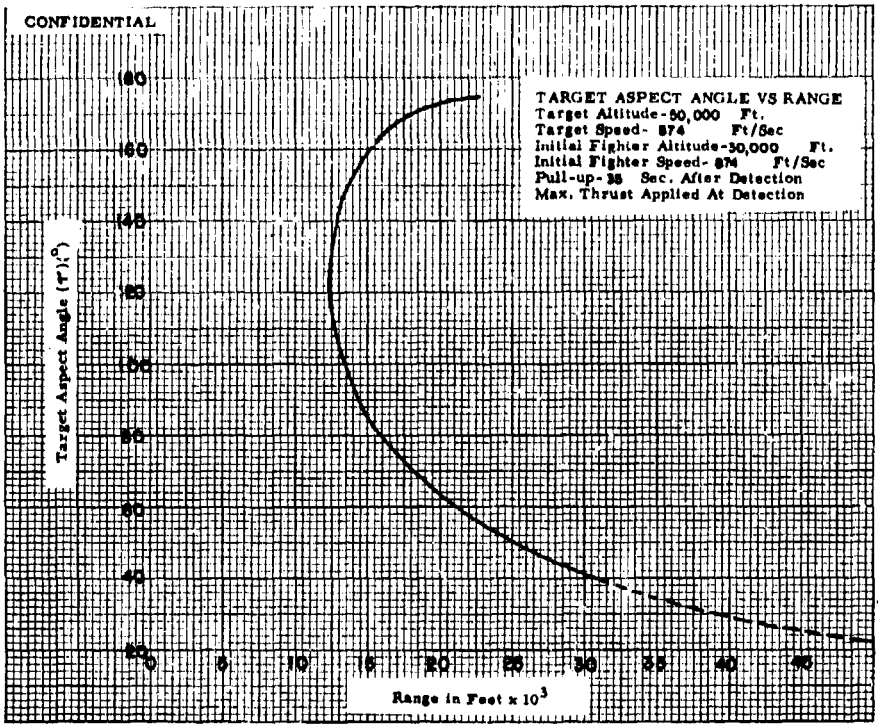

TARGET ASPECT ANGLE VS RANGE
Target Altitude- 50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up-30 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ψ) (°)
Range in Feet x 10³

Figure 564


TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-50,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 35 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ψ)(°)
Range in Feet x 10³

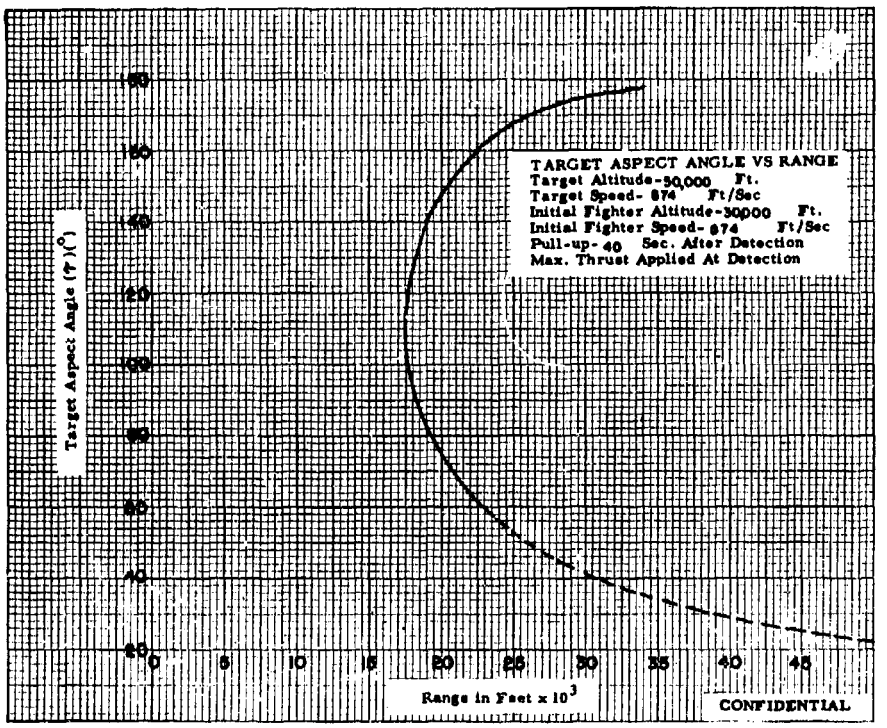
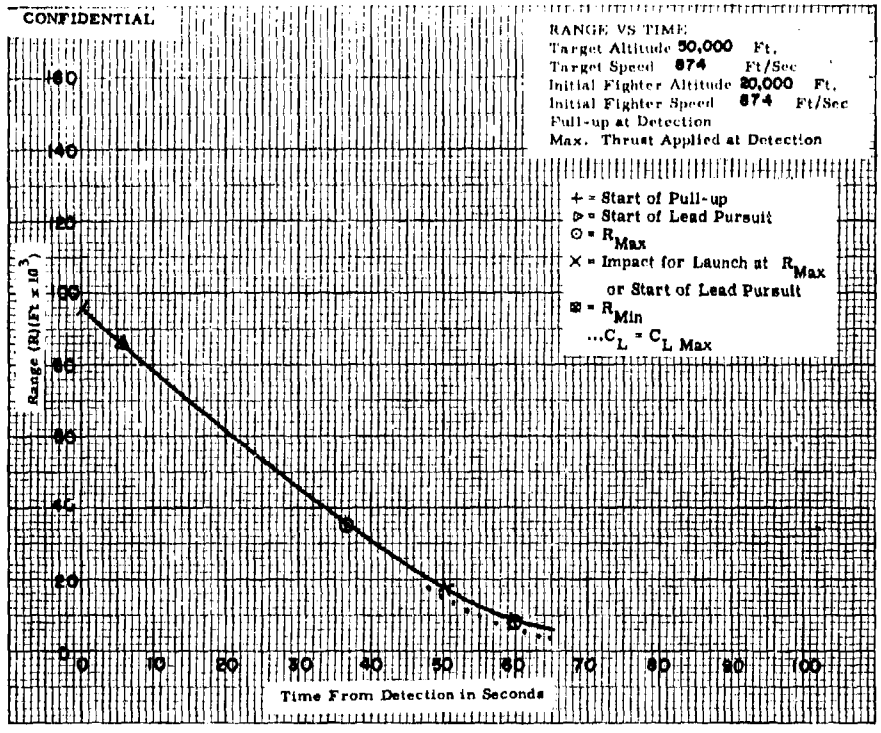

TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-30000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 40 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ψ)(°)
Range in Feet x 10³
CONFIDENTIAL

Figure 565


RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Full-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

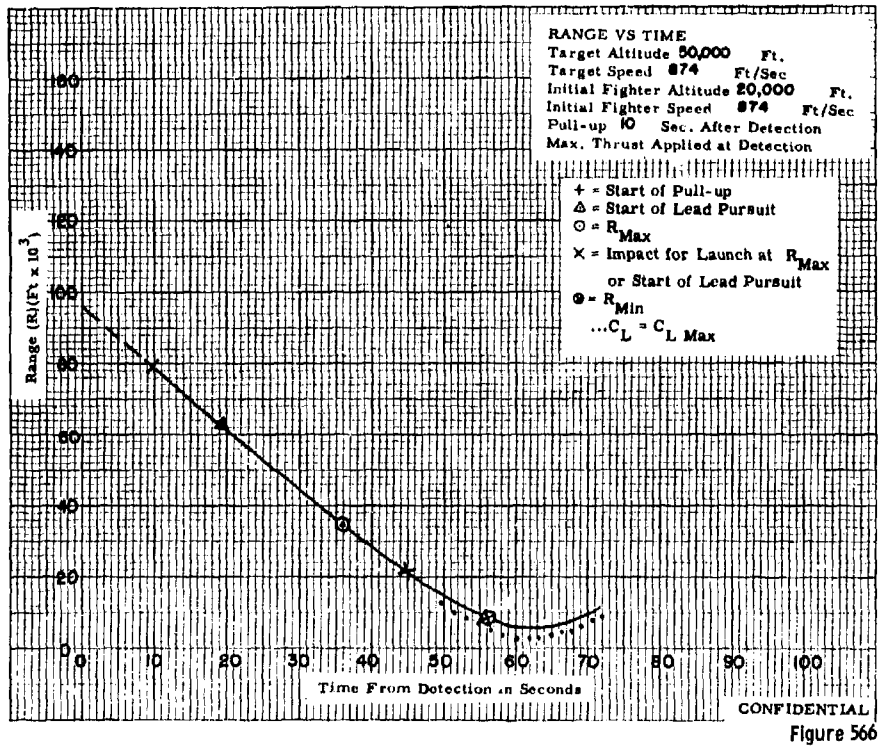
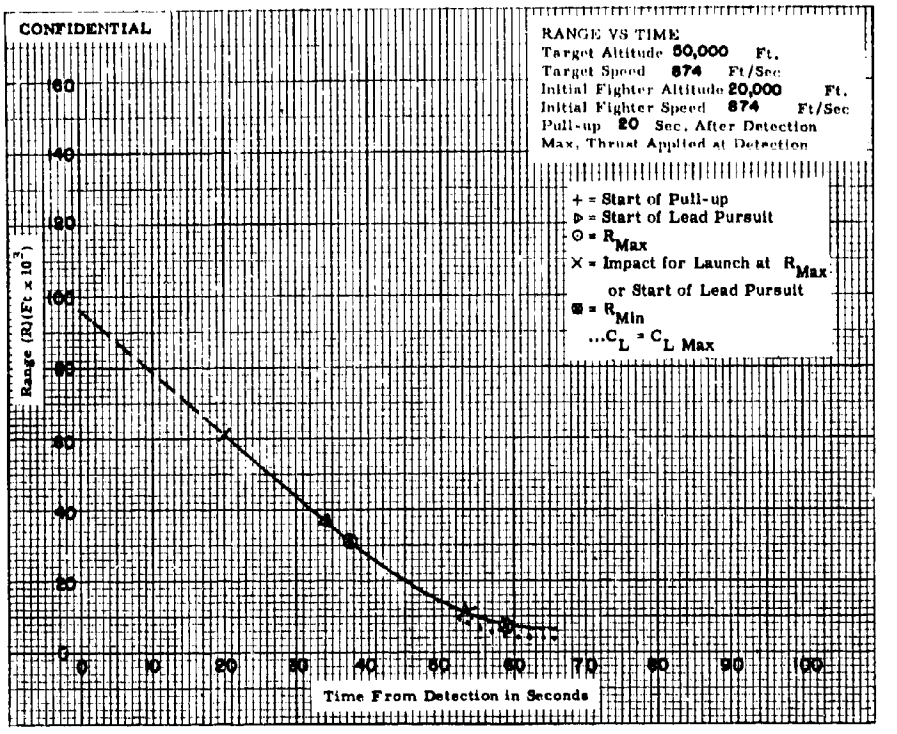

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊛ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

Figure 566


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
■ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

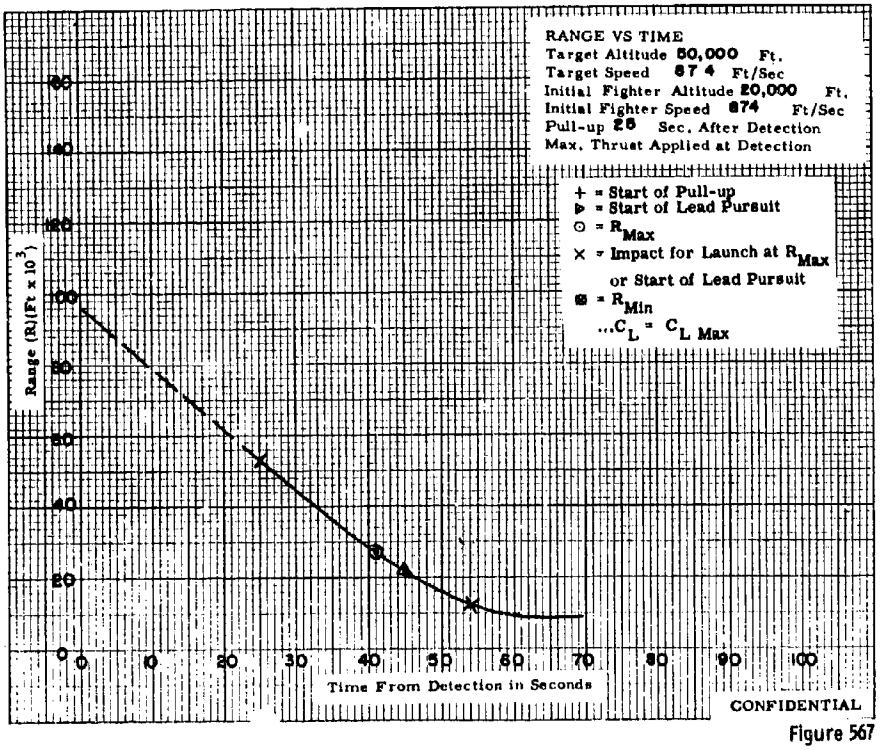
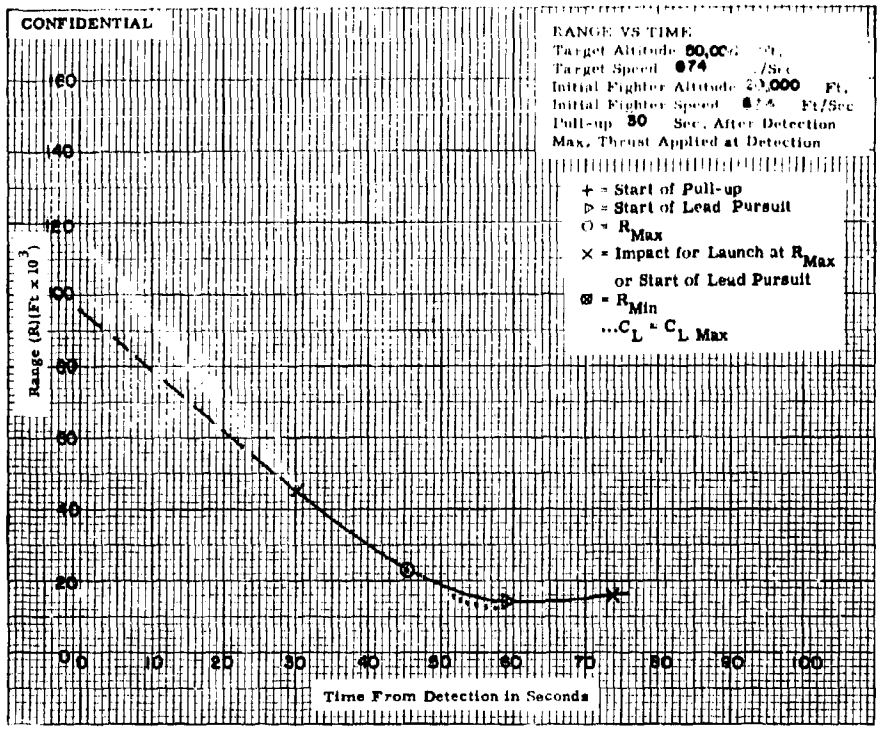

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
■ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 567


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

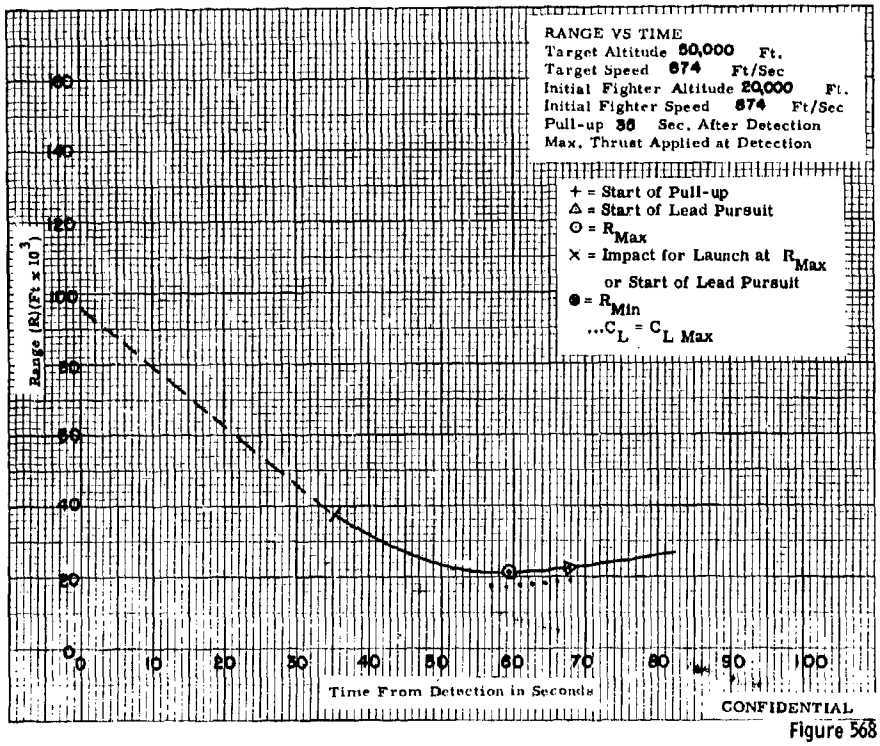
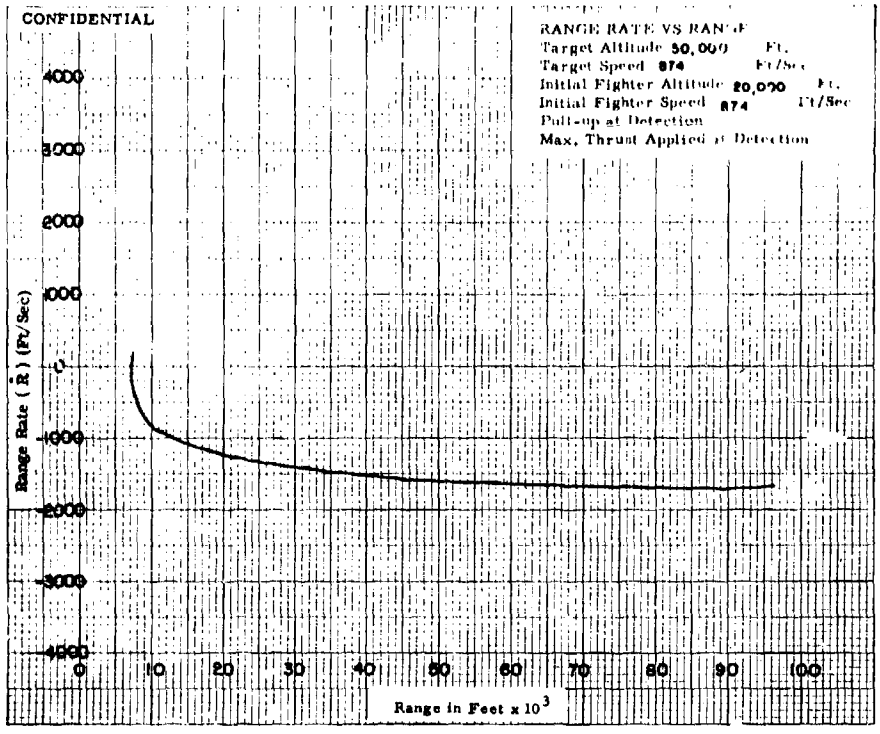

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 36 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
O = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
● = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 568


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

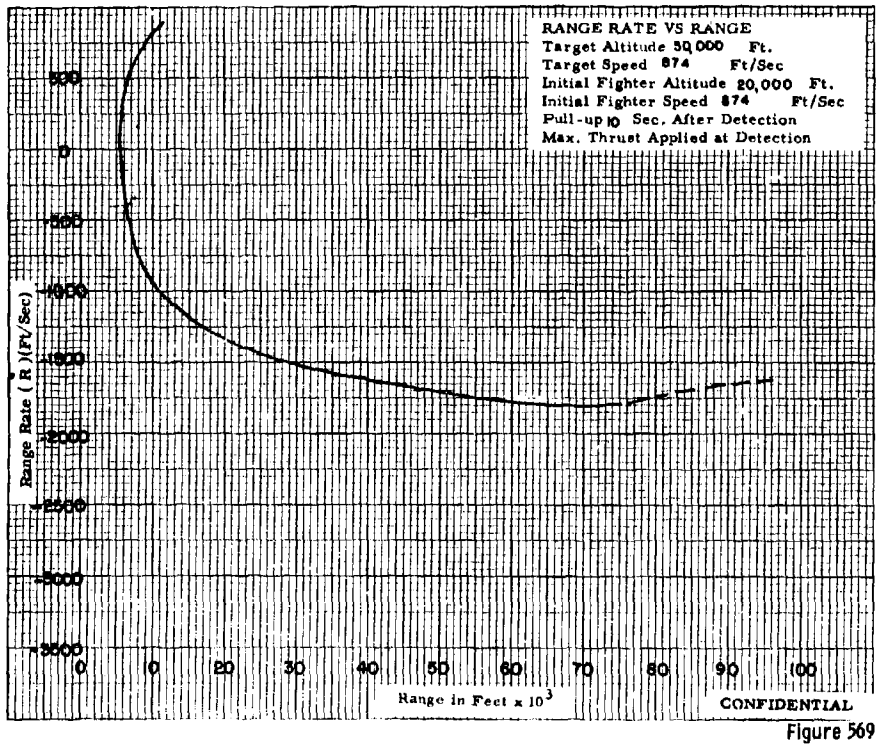
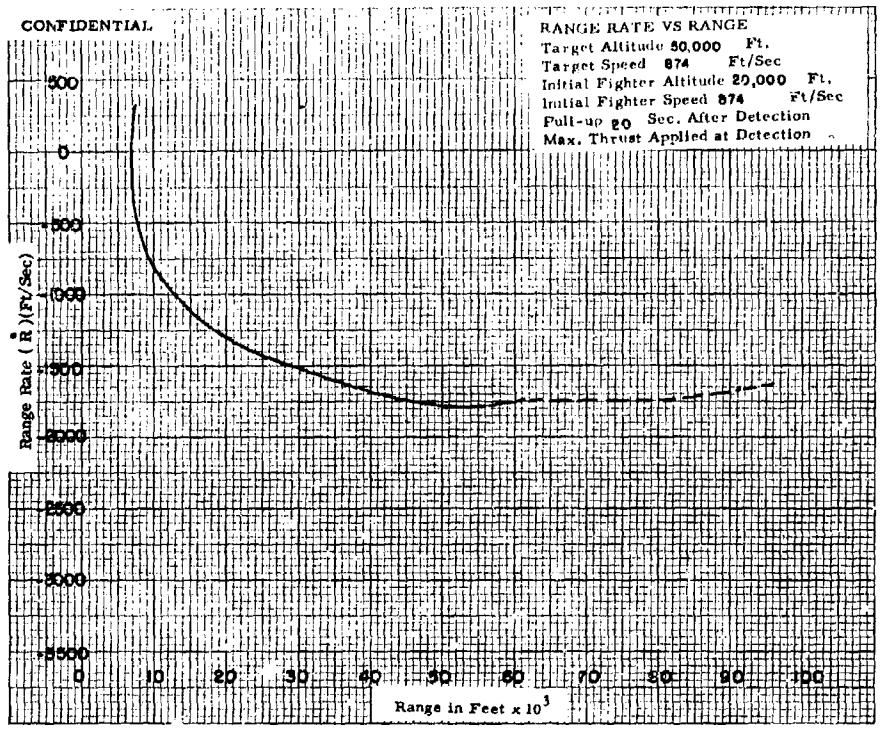

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 569


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

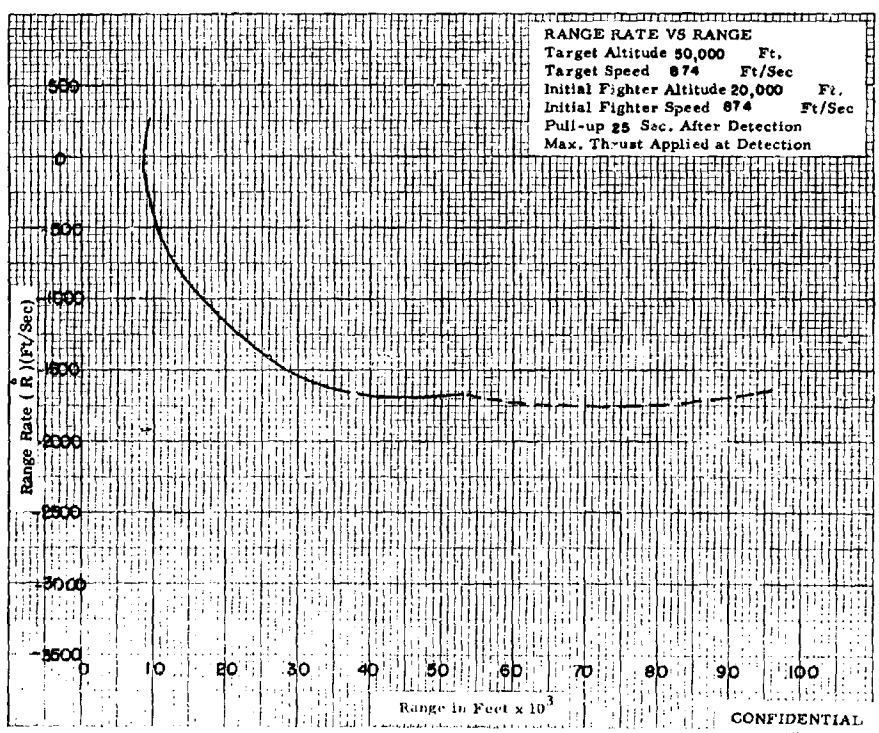
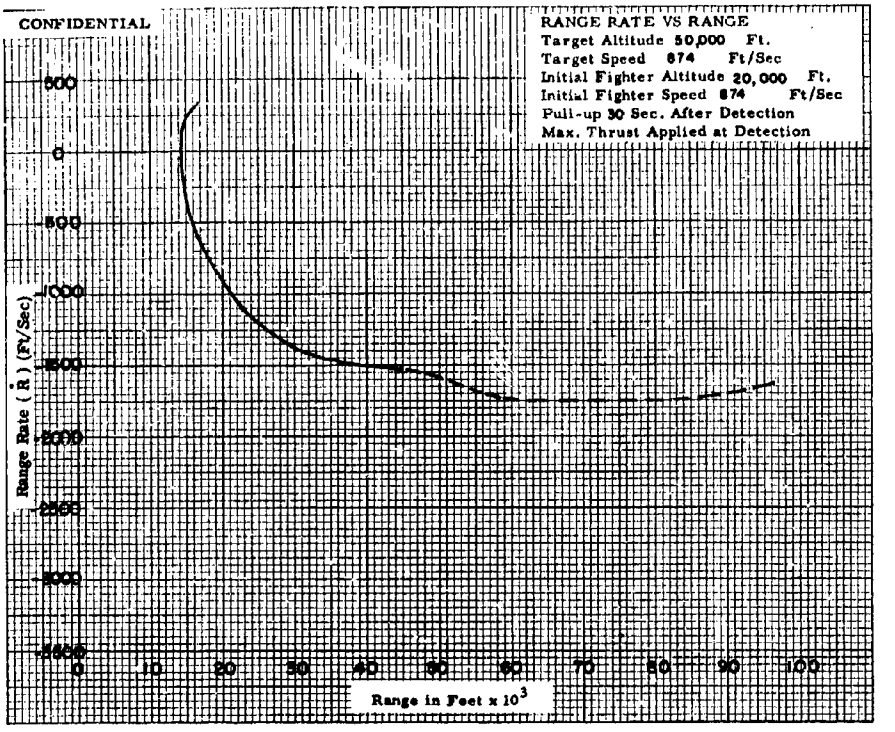

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 570


RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

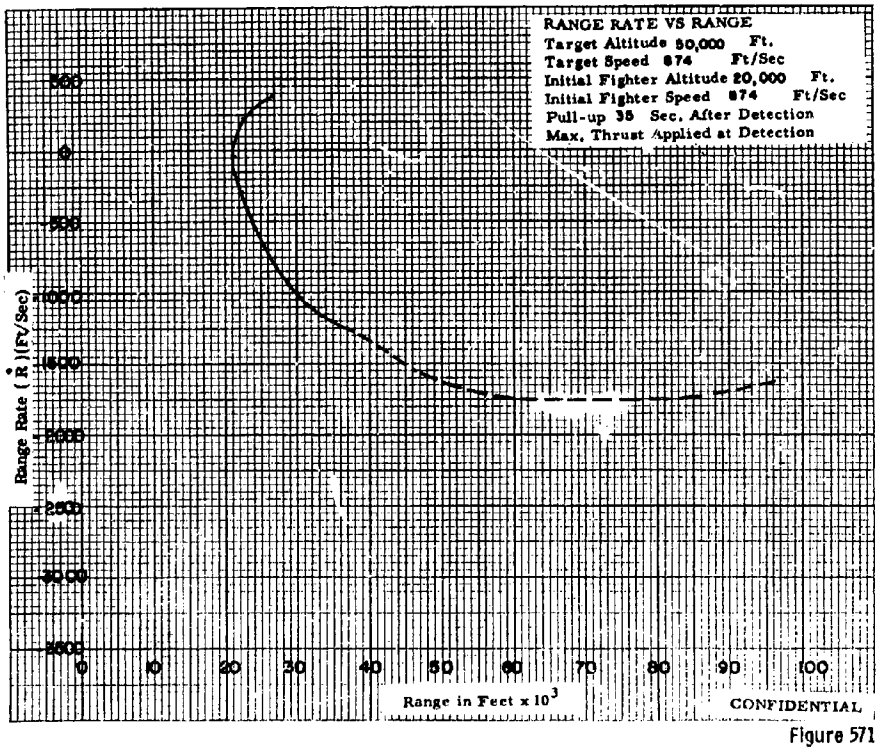
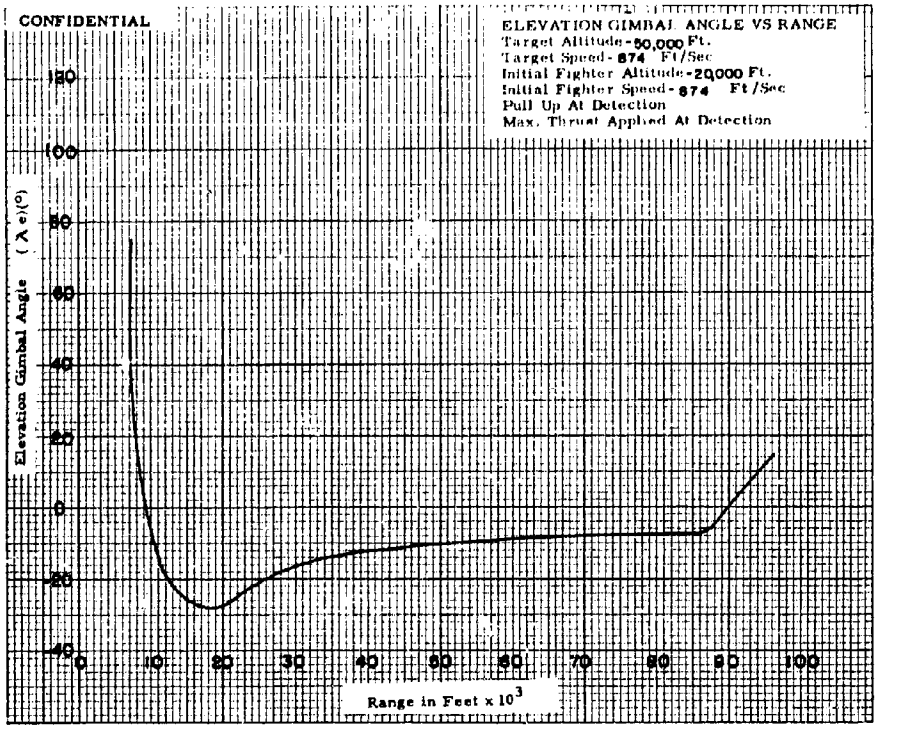

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 571


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull Up At Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λ e)(°)
120
100
80
60
40
20
0
-20
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

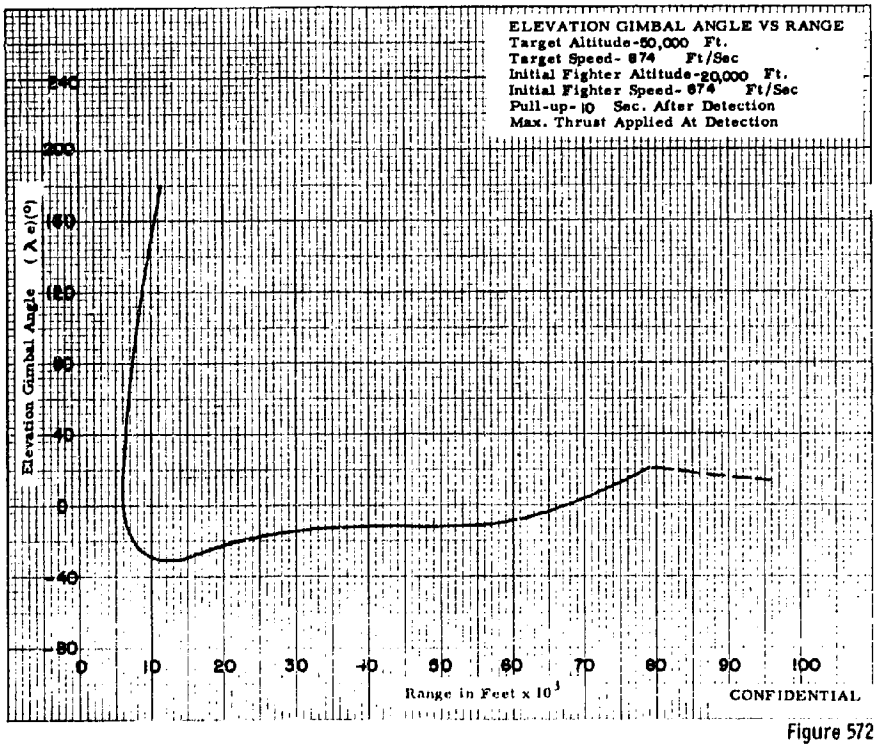
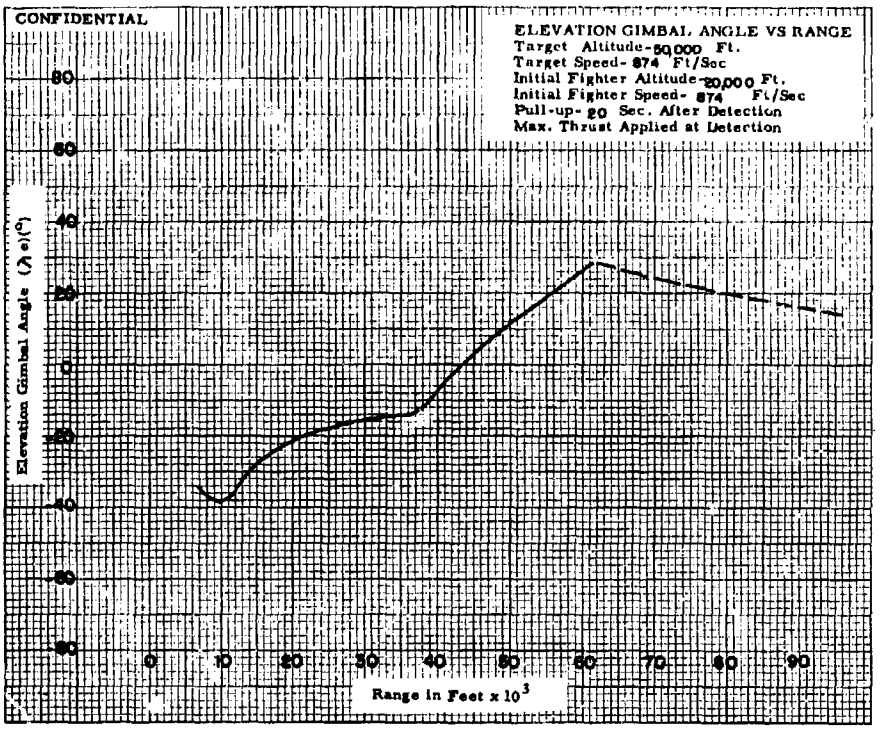

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λ e)(°)
240
200
160
120
80
40
0
-40
-80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 572


CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Gimbal Angle (λe)(°)
80
60
40
20
0
-20
-40
-60
-80
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10³

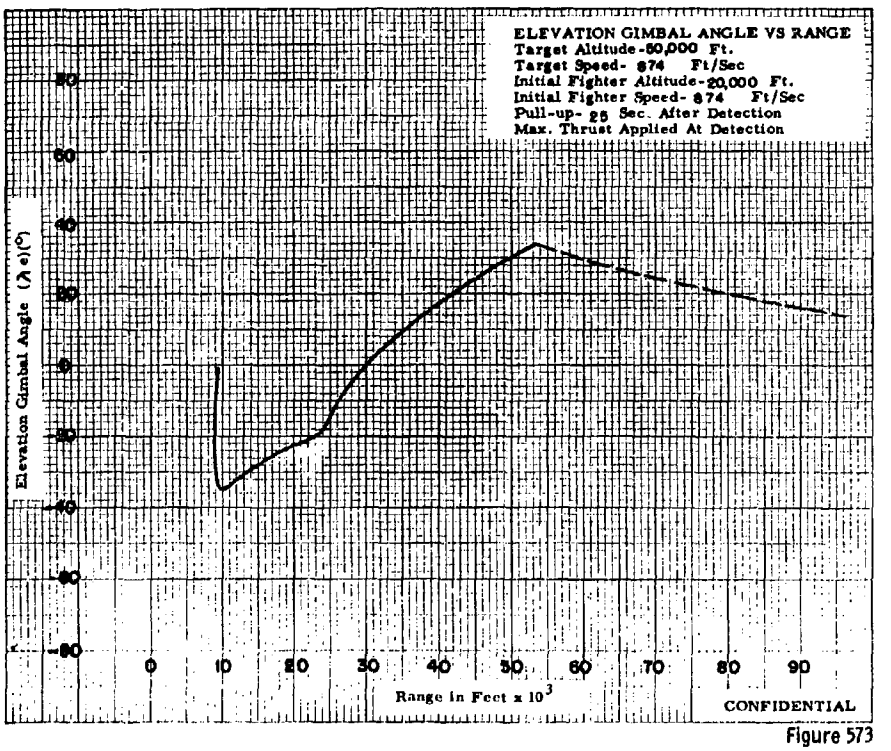
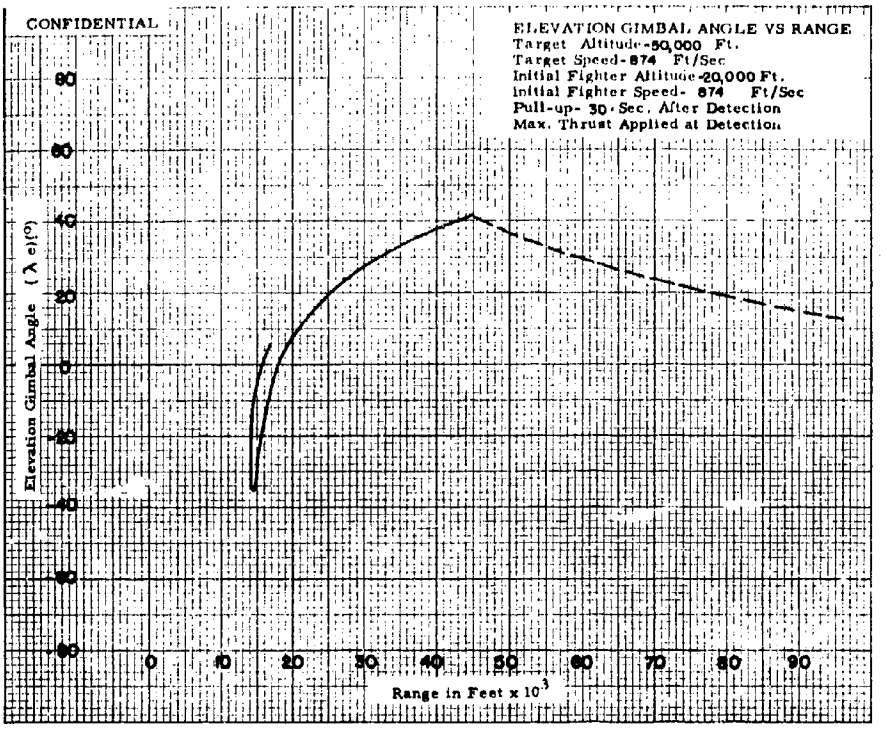

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 25 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
80
60
40
20
0
-20
-40
-60
-80
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10³
CONFIDENTIAL

Figure 573


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed-874 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 30 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Gimbal Angle (λe)(°)
80
60
40
20
0
-20
-40
-60
-80
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10³

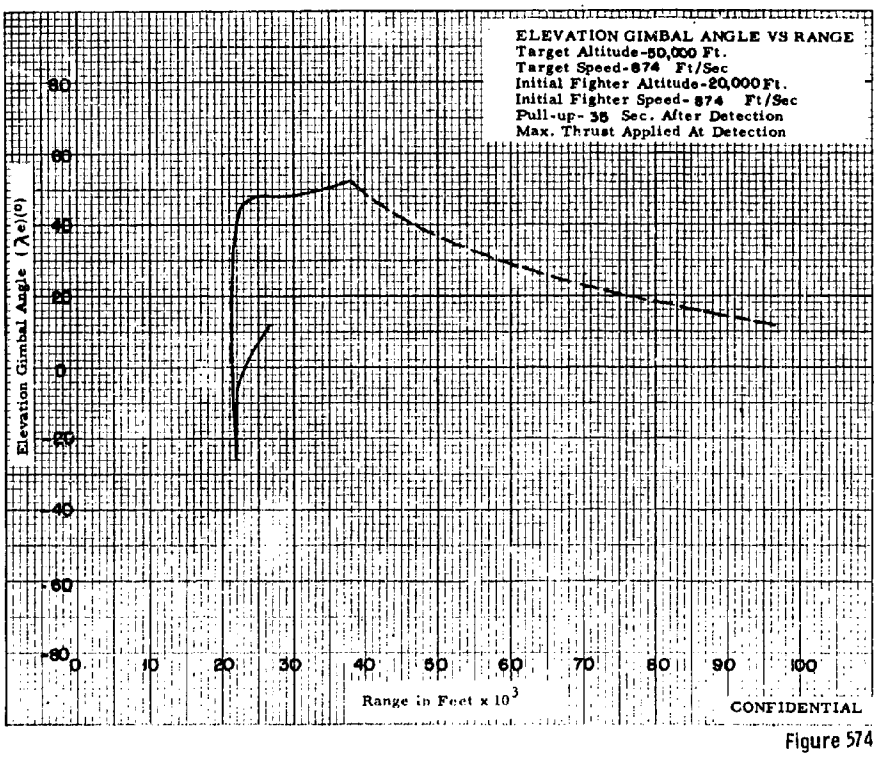
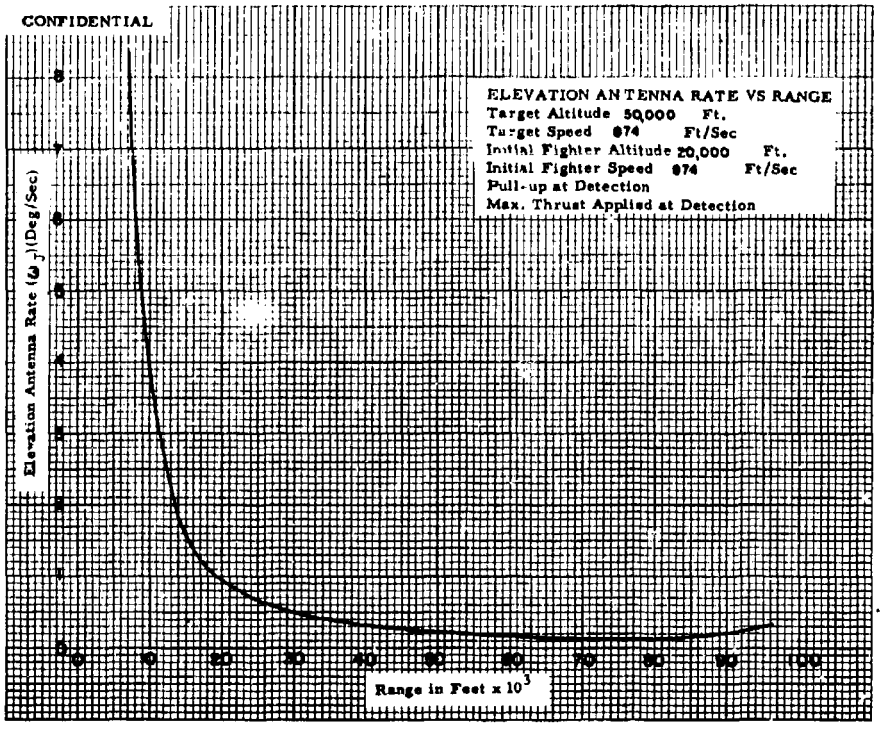

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed-874 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed-874 Ft/Sec
Pull-up- 35 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
80
60
40
20
0
-20
-40
-60
-80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 574


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_y)(Deg/Sec)
Range in Feet x 10^3

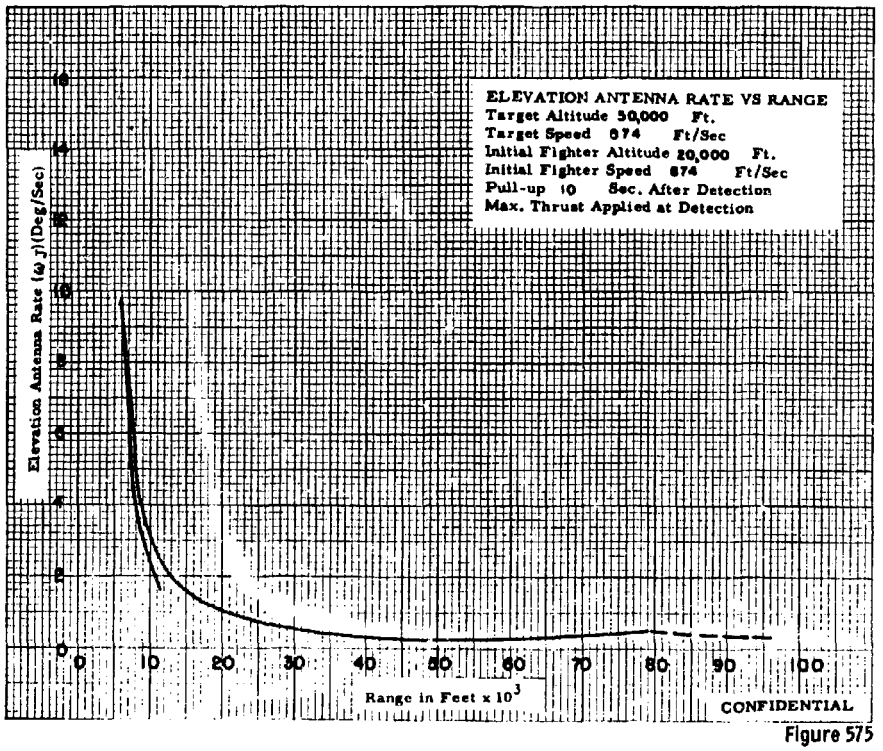
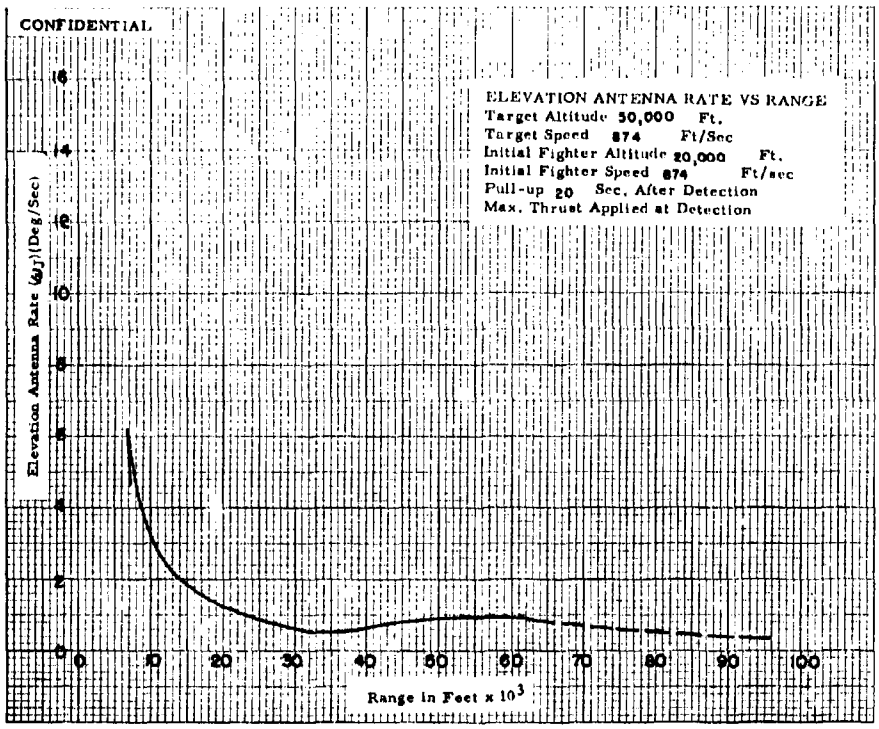

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_y)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 575


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ψj)(Deg/Sec)
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

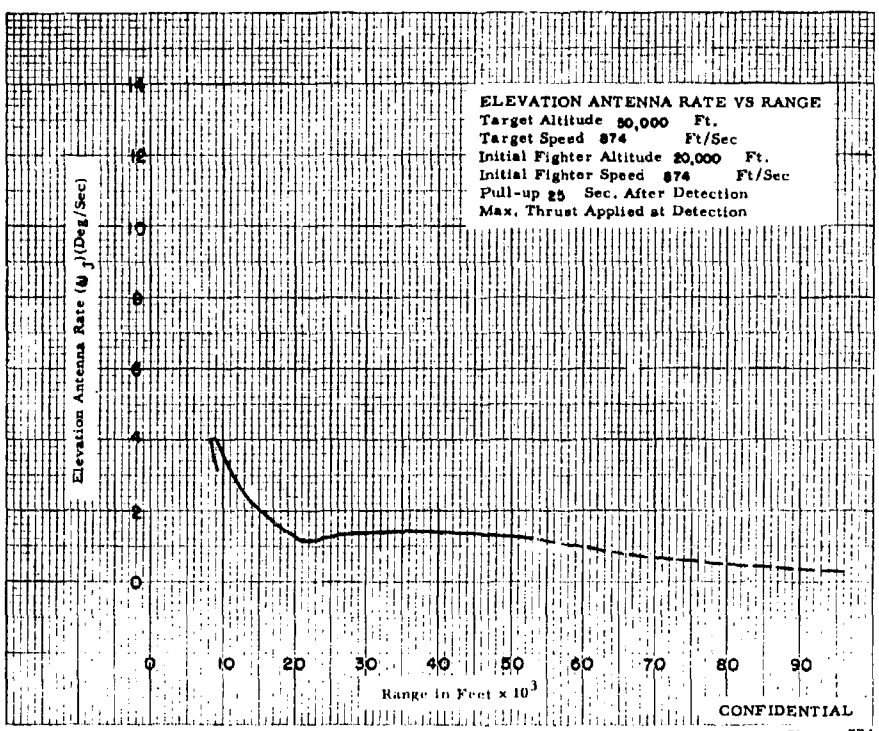
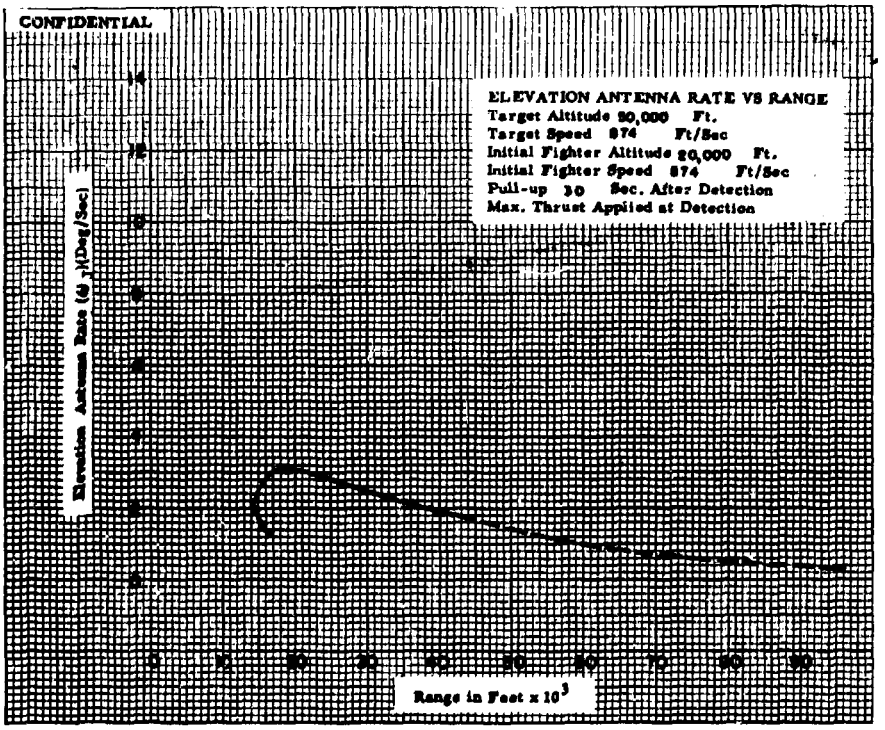

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ψj)(Deg/Sec)
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10³

Figure 576


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω γ)(Deg/Sec)
Range in Feet x 10^3

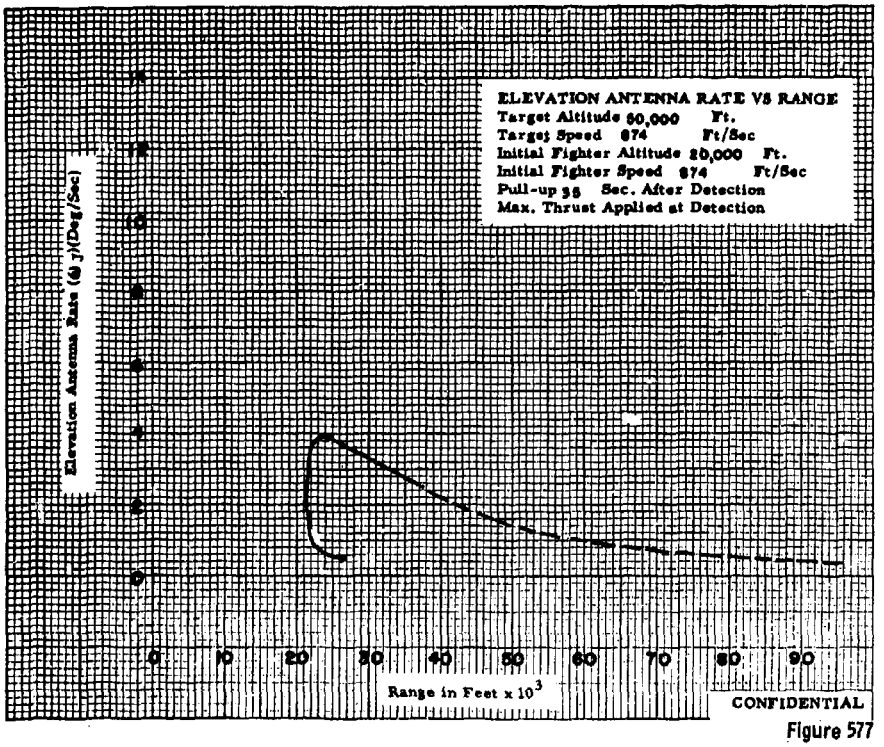
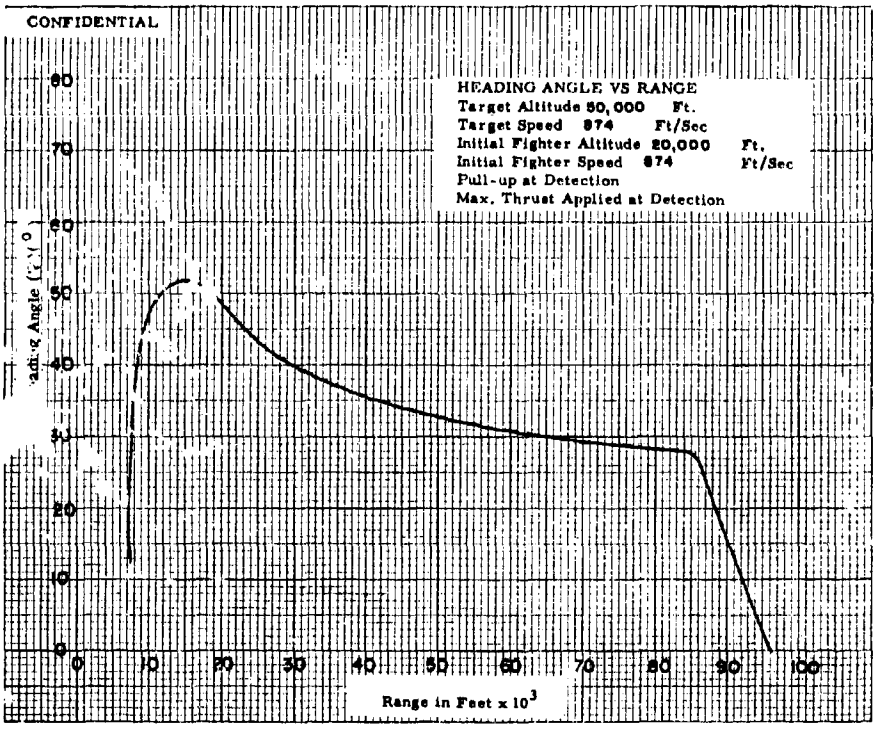

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω γ)(Deg/Sec)
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3
CONFIDENTIAL

Figure 577


HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Heading Angle (ψ) °
80
70
60
50
40
30
20
10
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10³

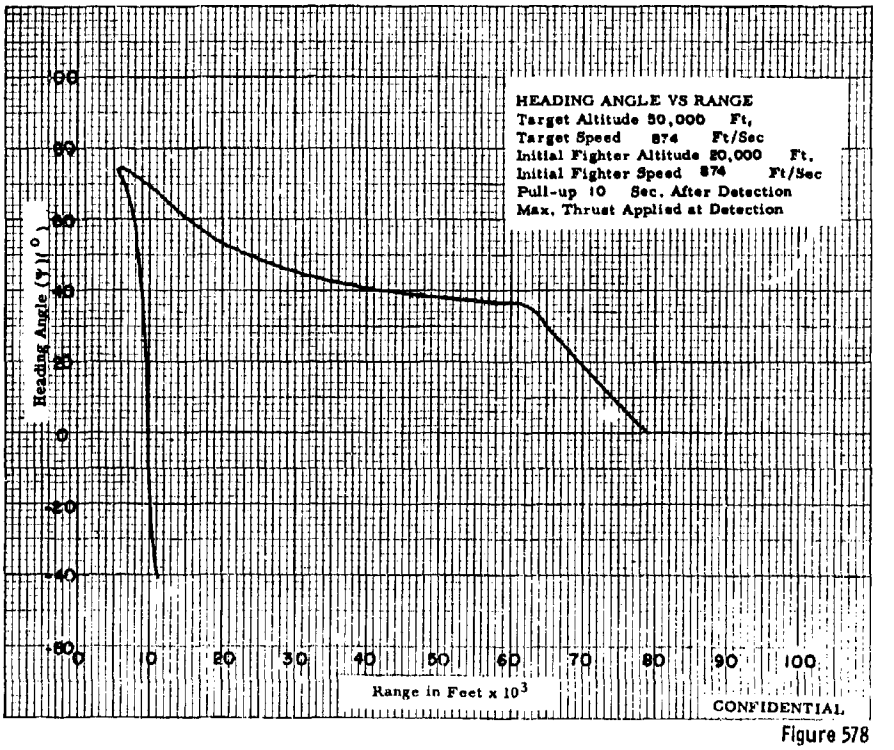

HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft,
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Heading Angle (ψ) (°)
90
80
60
40
20
0
-20
-40
-60
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10³
CONFIDENTIAL

Figure 578

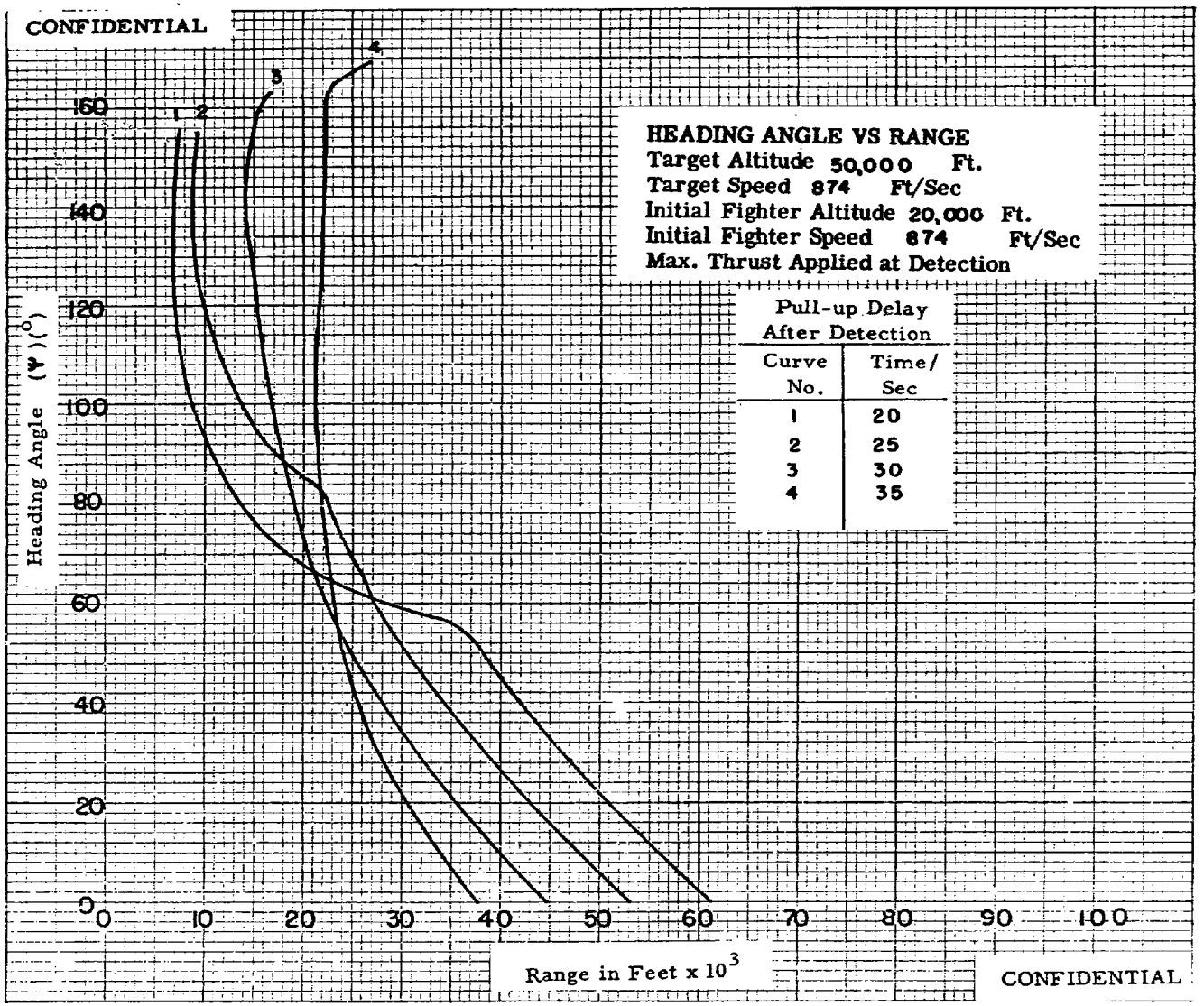
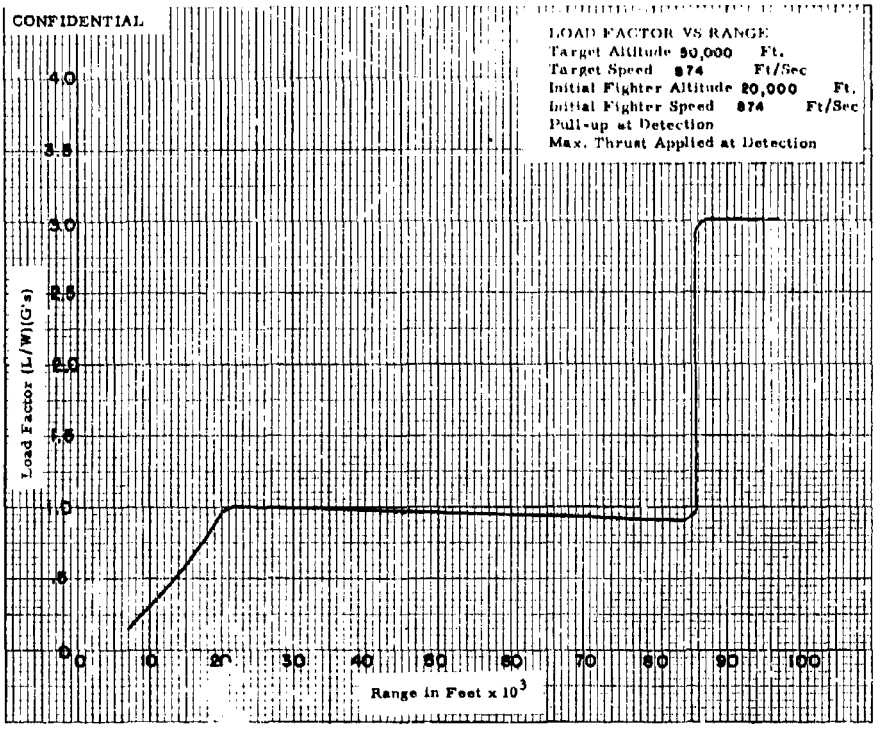

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 20
2 | 25
3 | 30
4 | 35
Heading Angle (Ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 579


LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

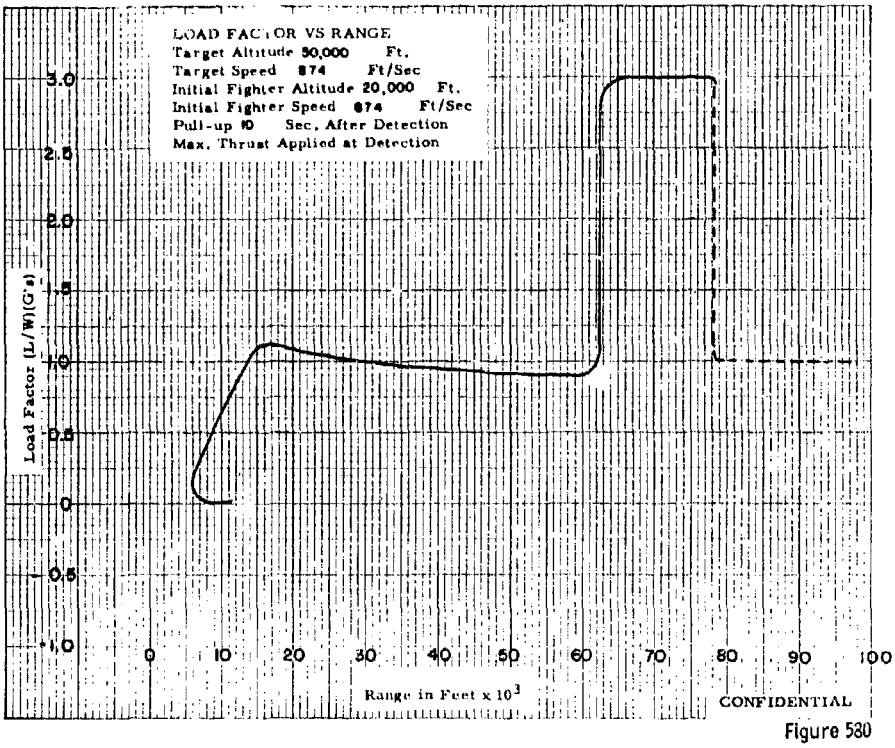
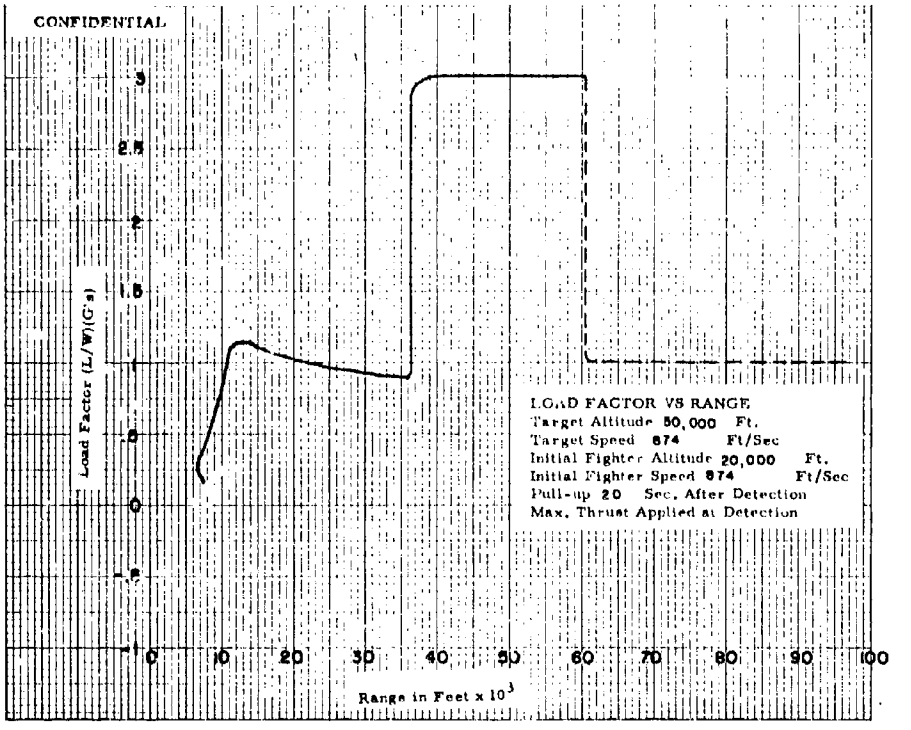

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 530


Load Factor (L/W)(G's)
3
2.5
2
1.5
1
0.5
0
-0.5
-1
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection

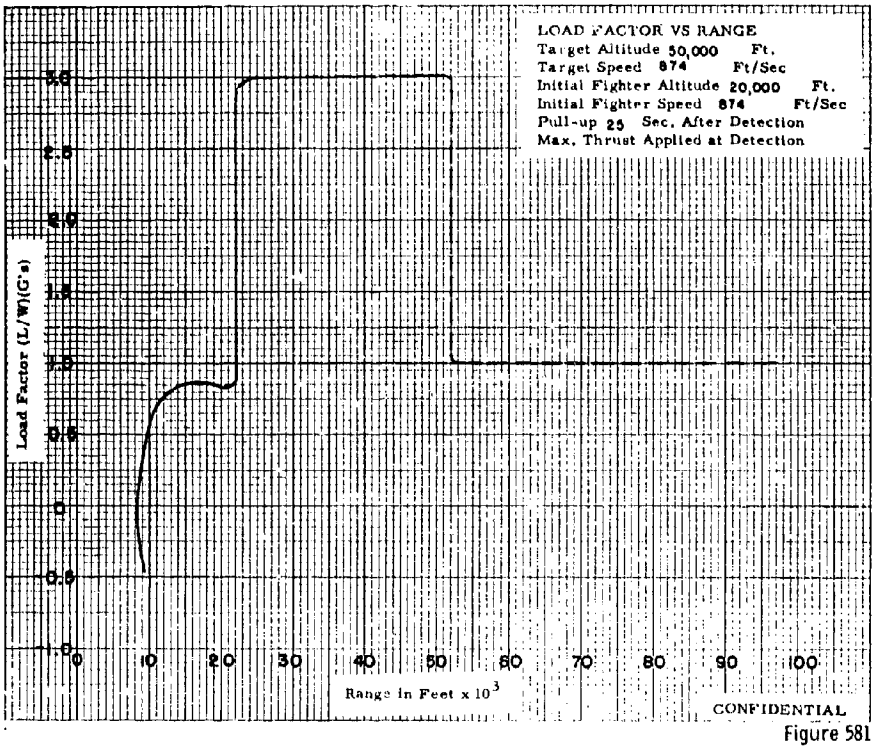
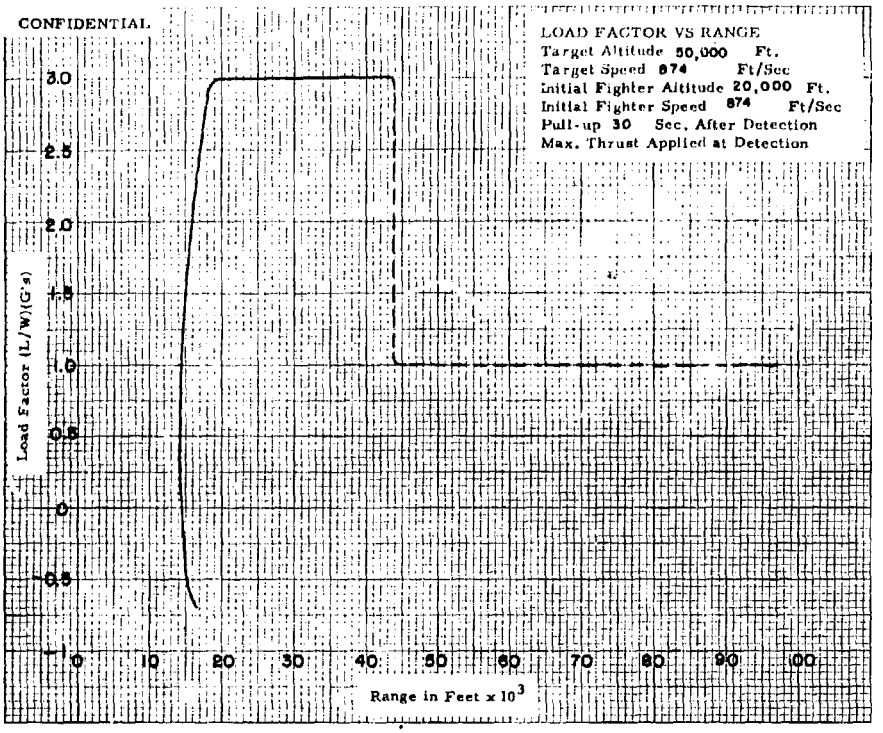
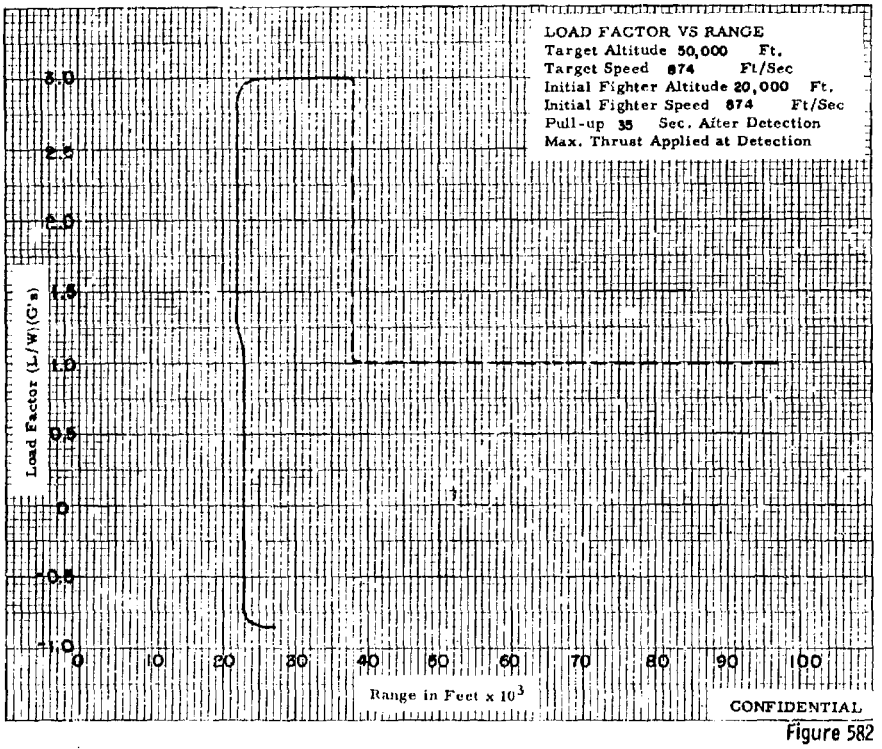

Load Factor (L/W)(G's)
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
CONFIDENTIAL

Figure 581

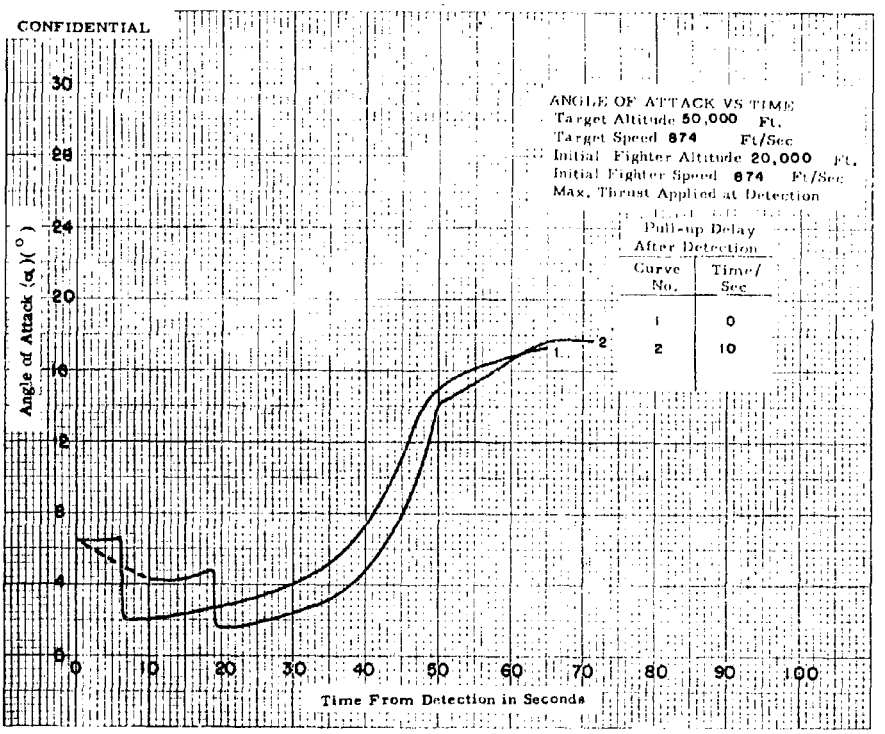
CONFIDENTIAL





CONFIDENTIAL

Figure 582


ANGLE OF ATTACK VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
Angle of Attack (α)(°)
Time From Detection in Seconds

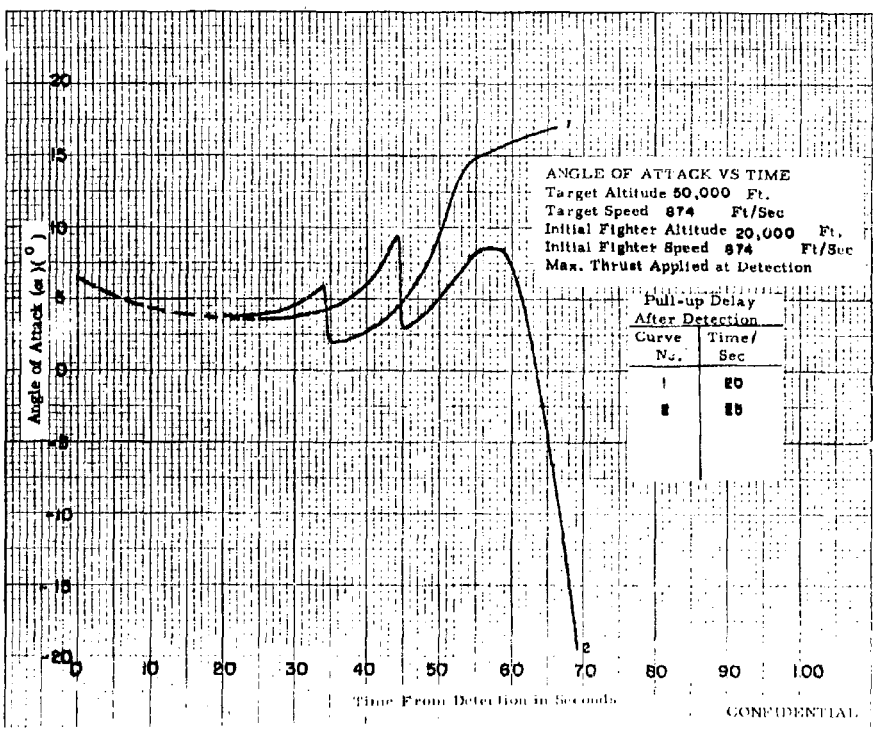
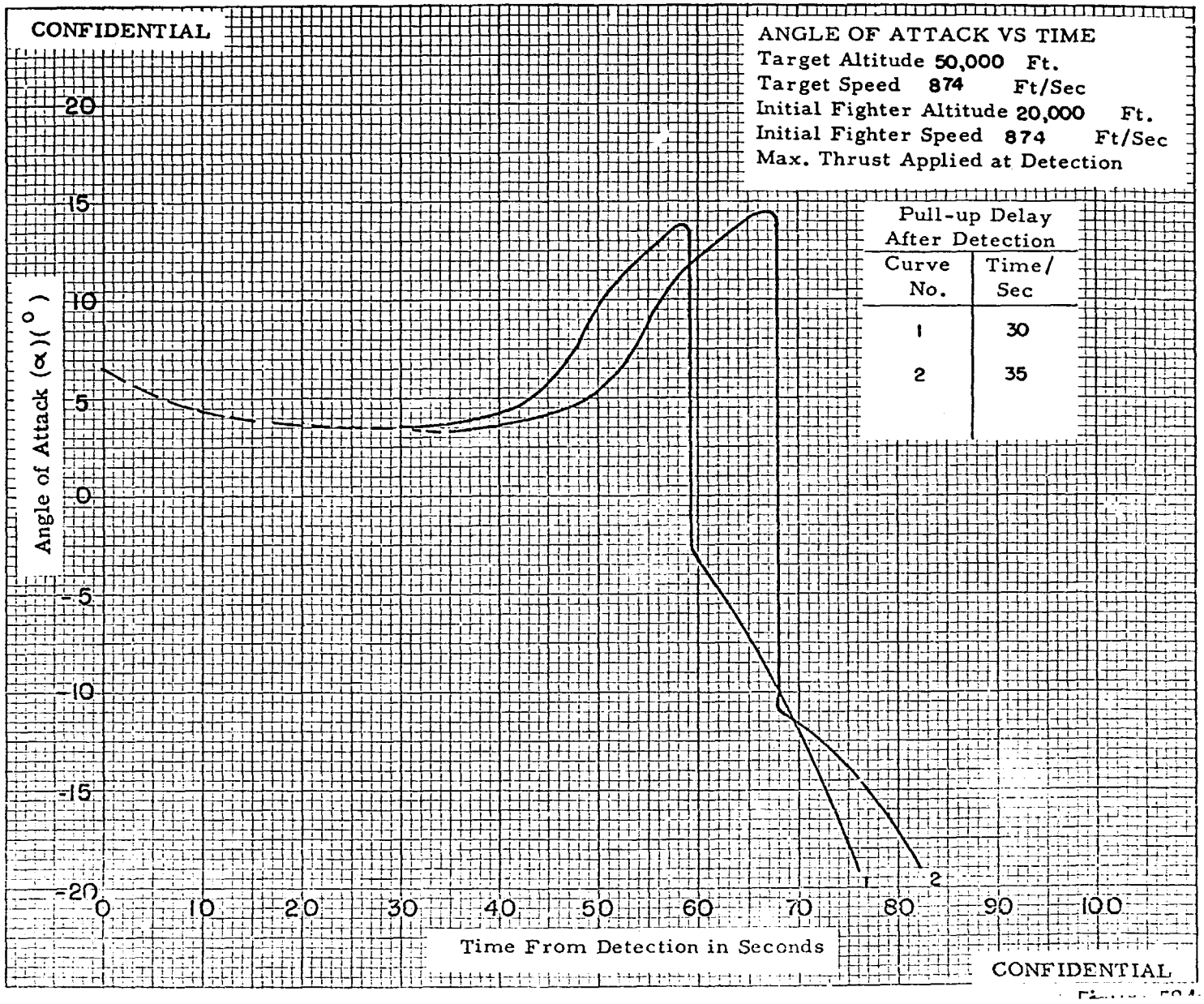

ANGLE OF ATTACK VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 20
2 | 25
Angle of Attack (α)(°)
Time From Detection in Seconds

Figure 583

CONFIDENTIAL



CONFIDENTIAL

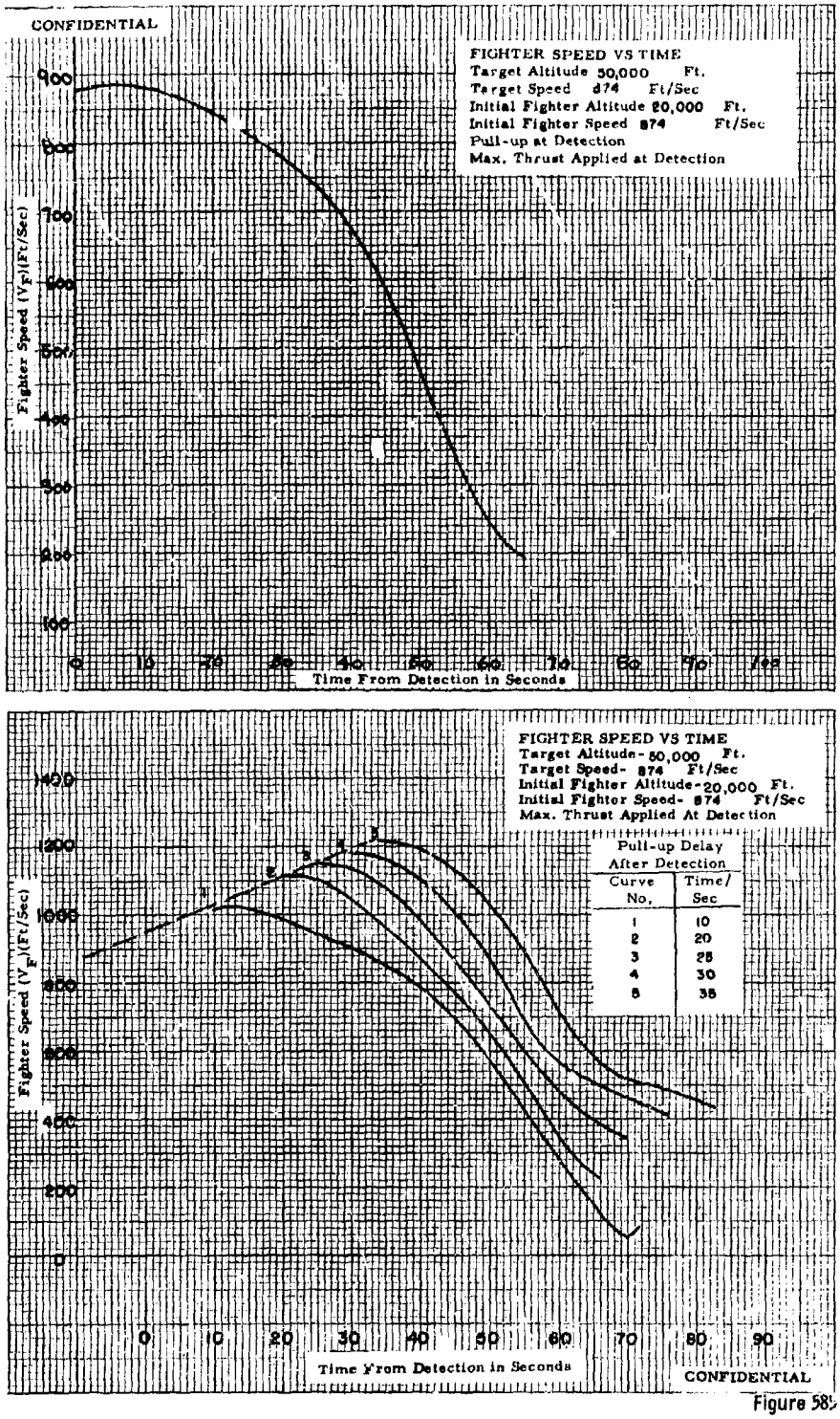
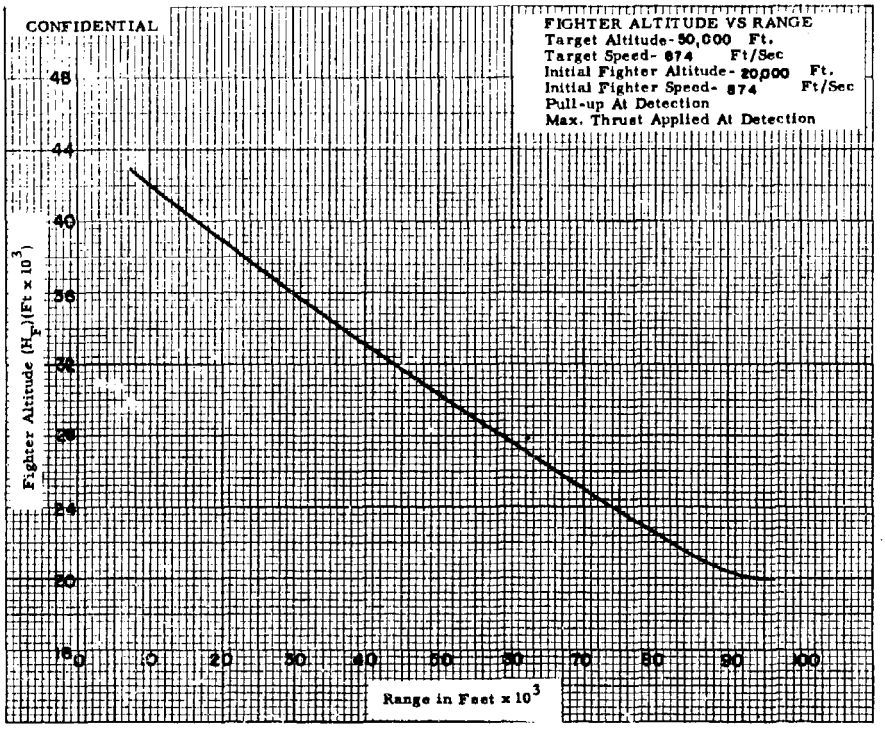

CONFIDENTIAL
FIGHTER SPEED VS TIME
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Fighter Speed (V_F)(Ft/Sec)
900
800
700
600
500
400
300
200
100
0
10
20
30
40
50
60
70
80
90
Time From Detection in Seconds
FIGHTER SPEED VS TIME
Target Altitude- 50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 10
2 | 20
3 | 25
4 | 30
5 | 35
Fighter Speed (V_F)(Ft/Sec)
1400
1200
1000
800
600
400
200
0
1
2
3
4
5
0
10
20
30
40
50
60
70
80
90
Time From Detection in Seconds
CONFIDENTIAL

Figure 58


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude- 50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up At Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
48
44
40
36
32
28
24
20
16
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

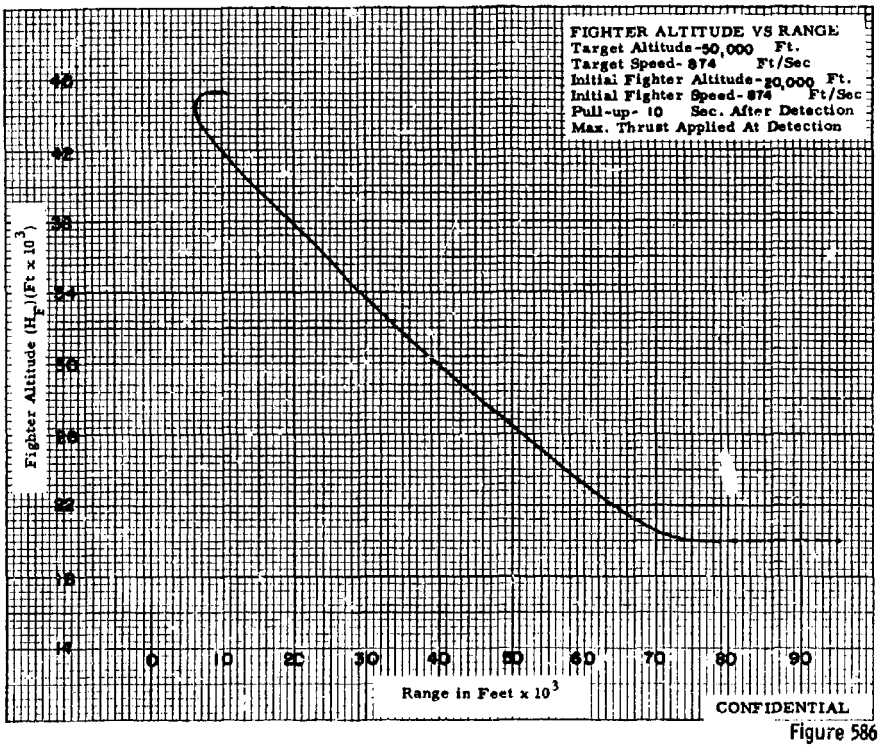
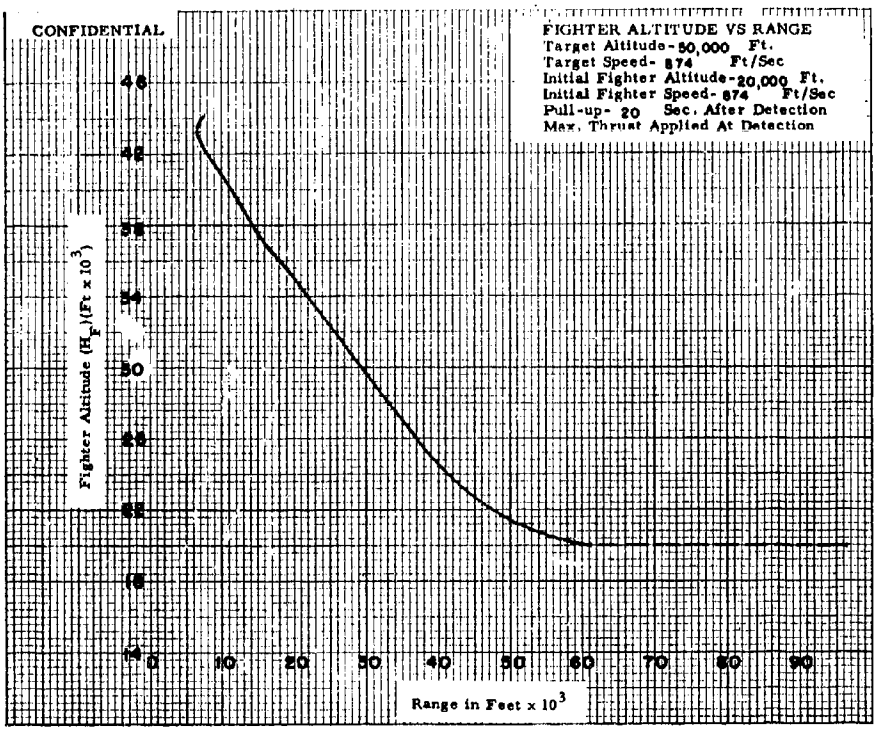

FIGHTER ALTITUDE VS RANGE
Target Altitude- 50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
40
36
32
28
24
20
16
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3
CONFIDENTIAL

Figure 586


FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90

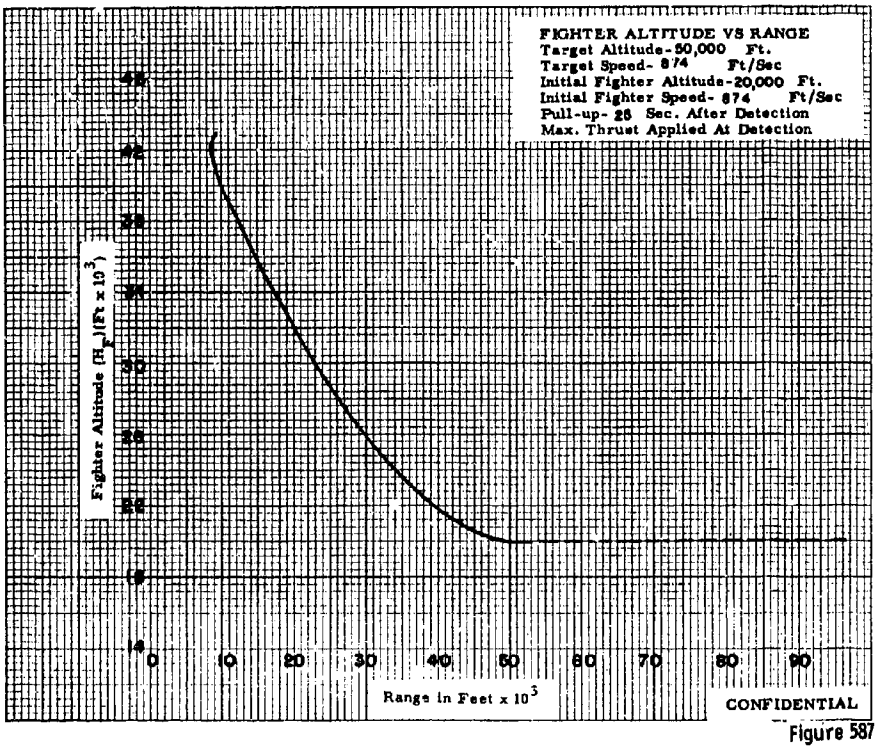
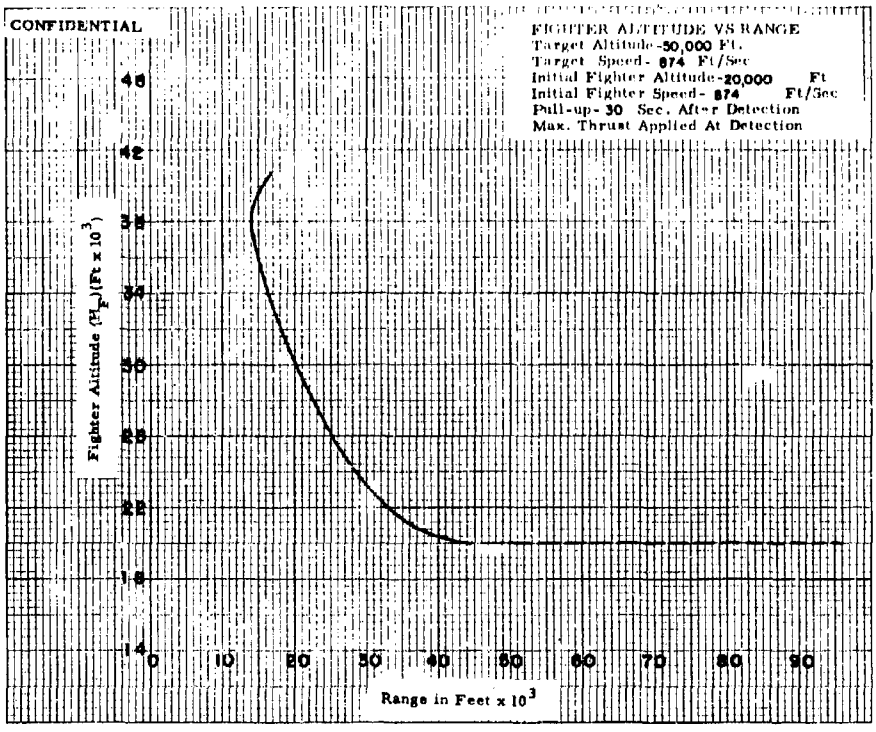

FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 25 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90

Figure 587


FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-20,000 Ft
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 30 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
46
42
38
34
30
26
22
18
14
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3

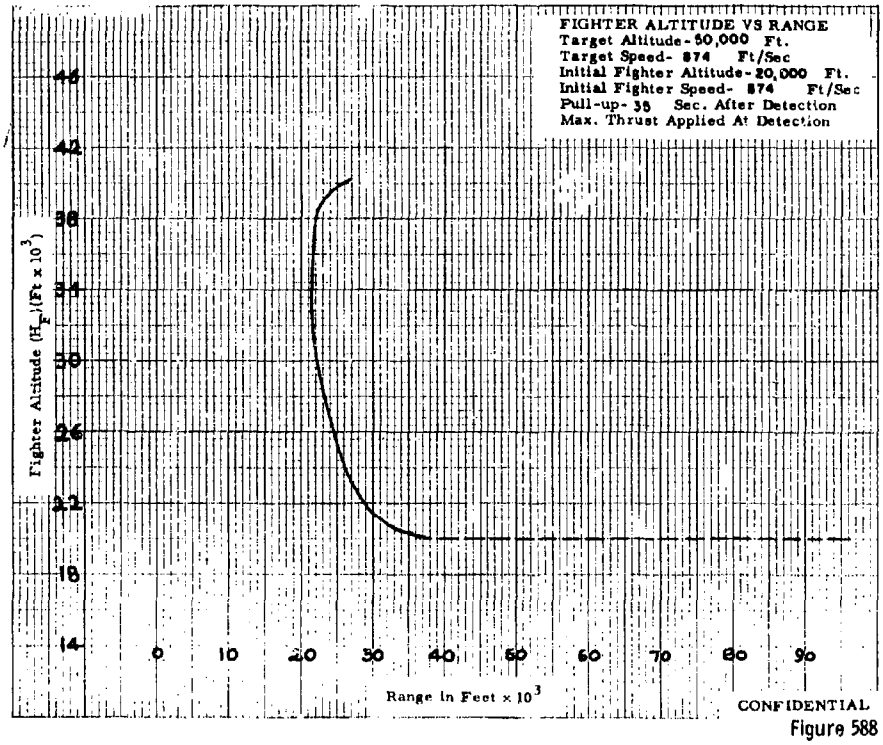
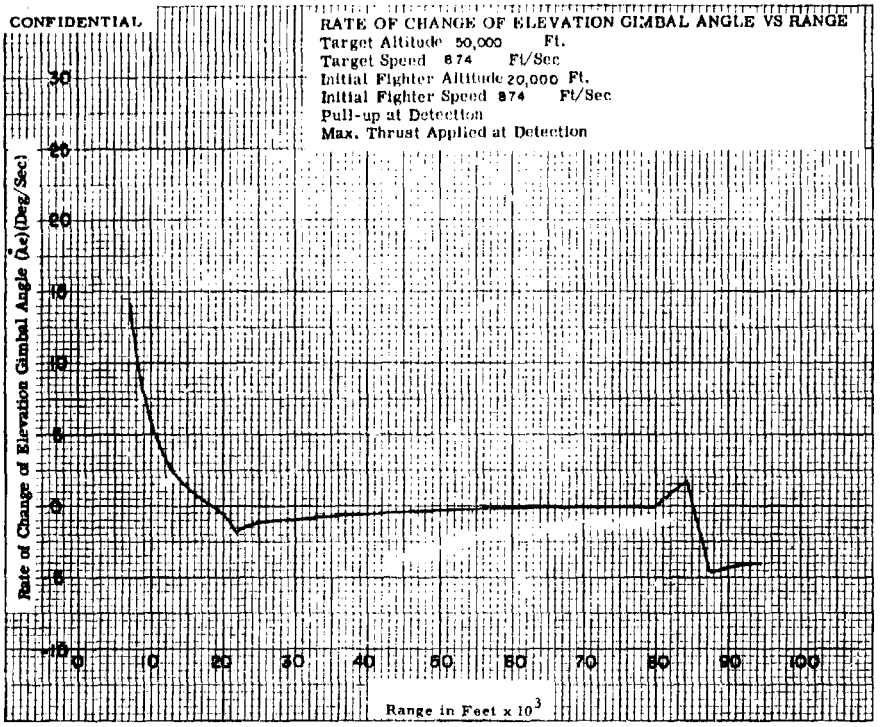

FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 35 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
46
42
38
34
30
26
22
18
14
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3

Figure 588


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

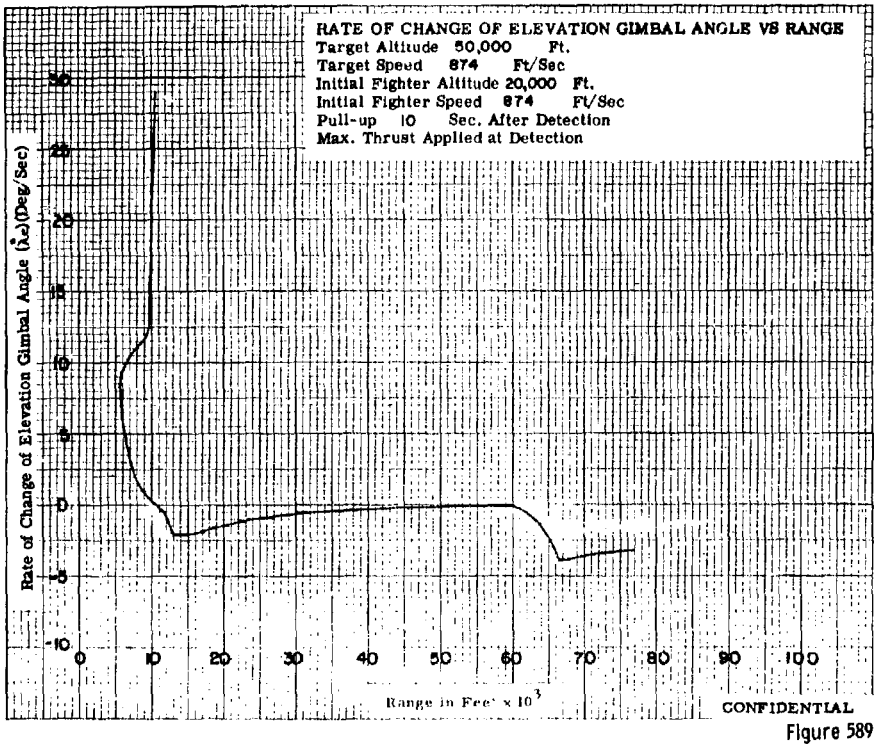
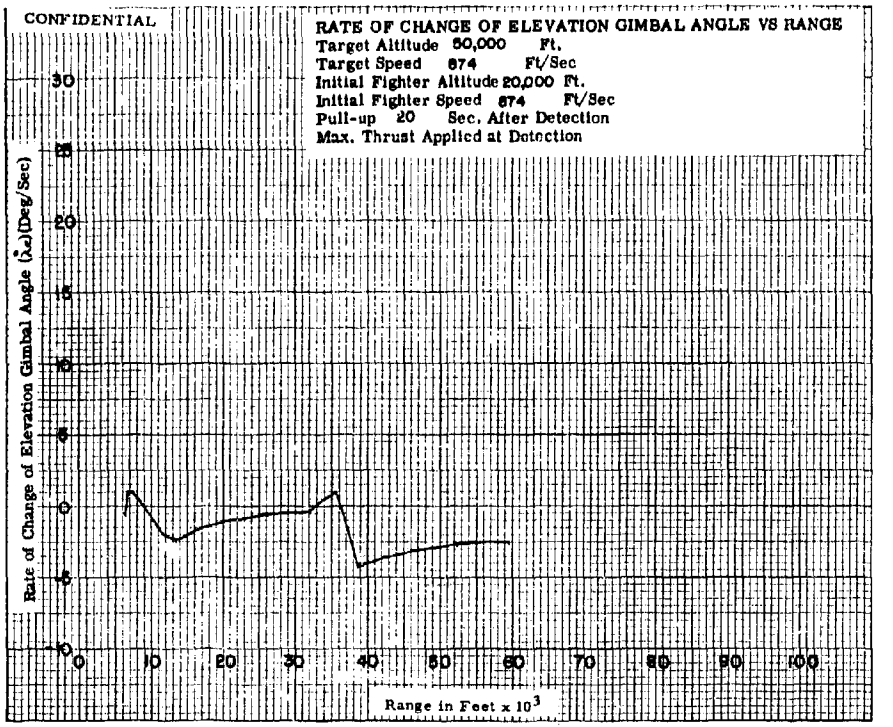

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 589


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

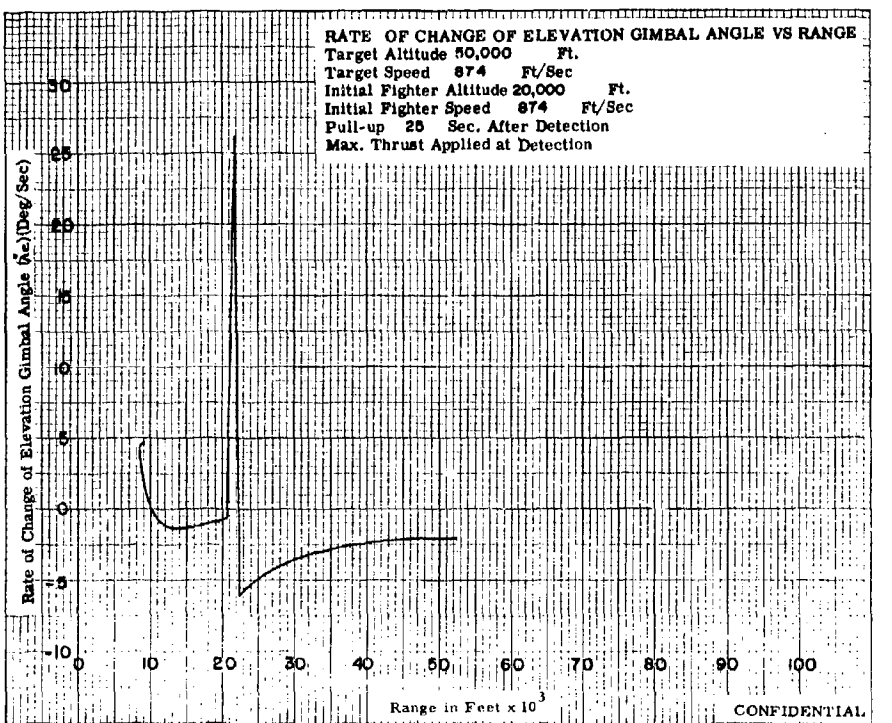
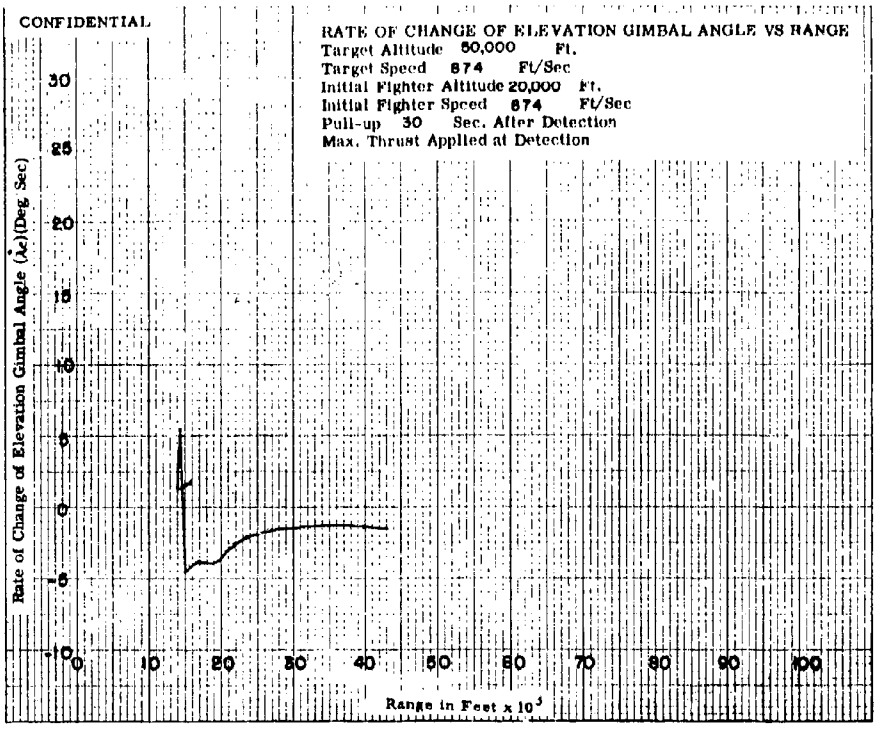

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 590


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg. Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

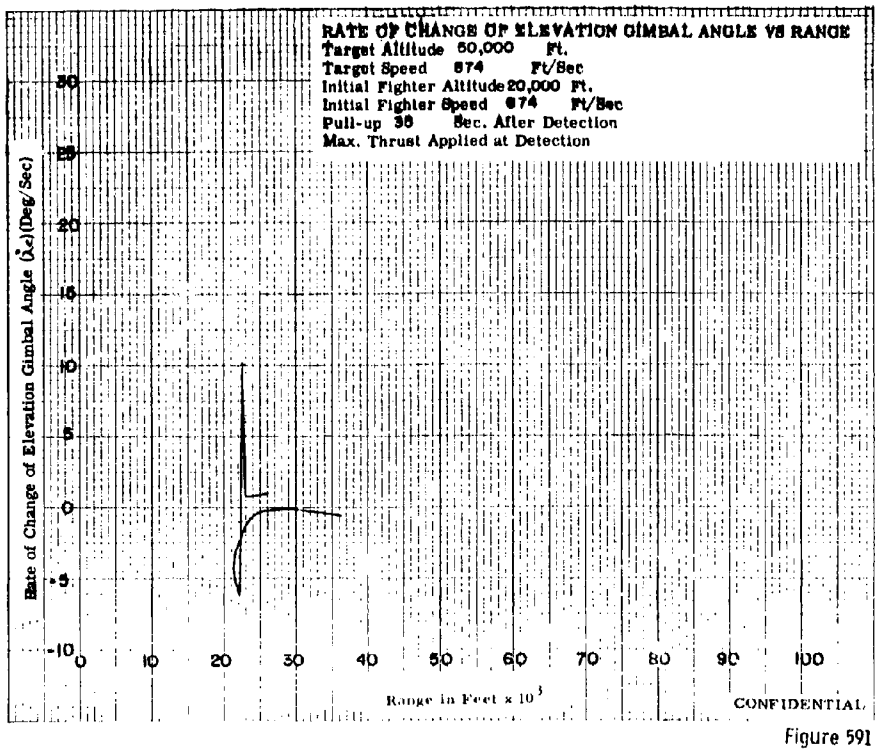
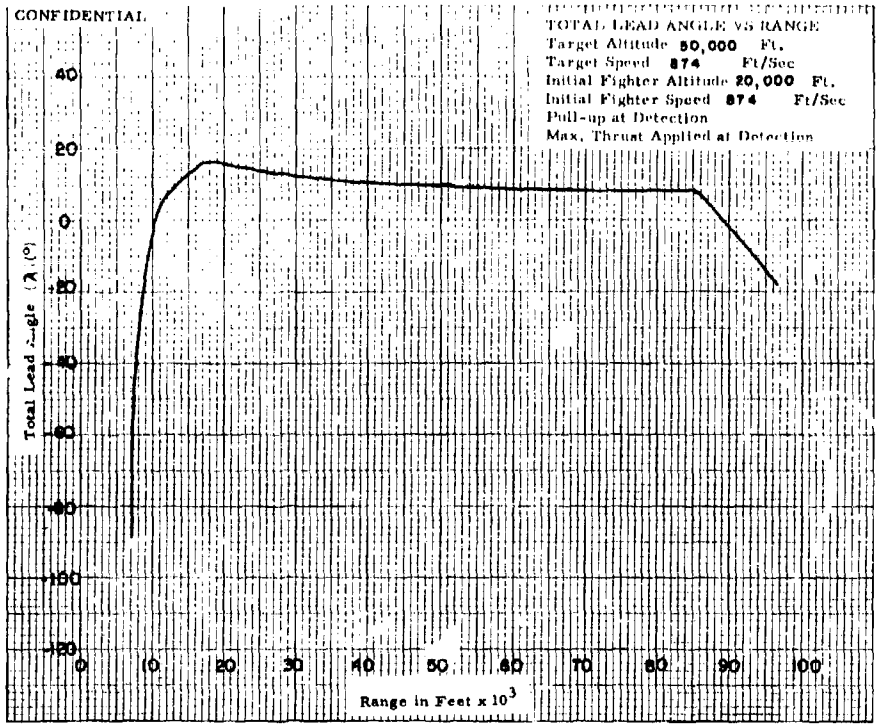

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 591


TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
40
20
0
-20
-40
-60
-80
-100
-120
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

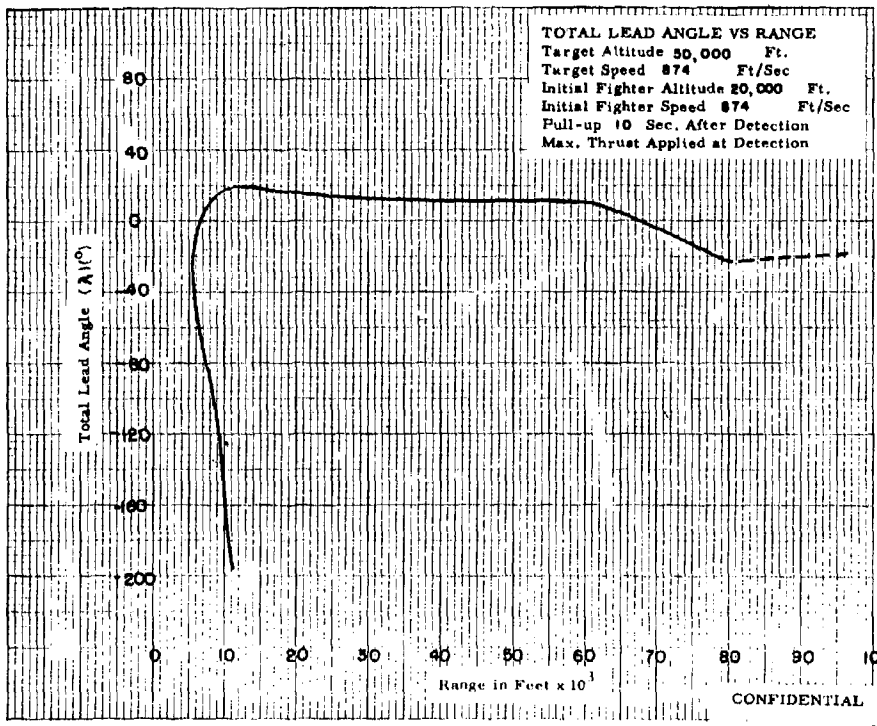
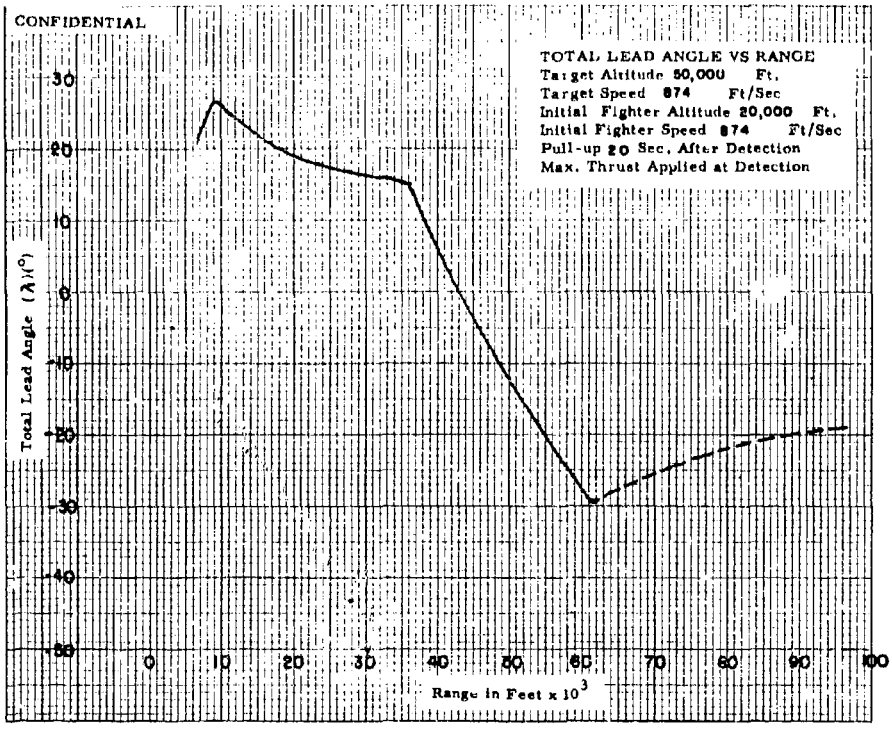

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
80
40
0
-40
-80
-120
-160
-200
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 592


TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λi(°)
30
20
10
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

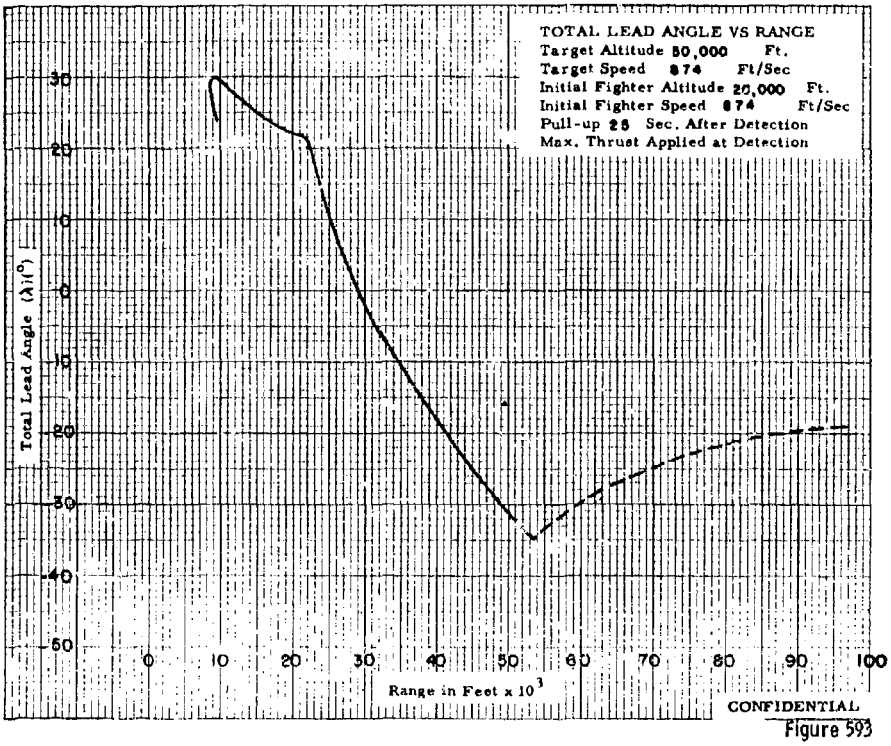
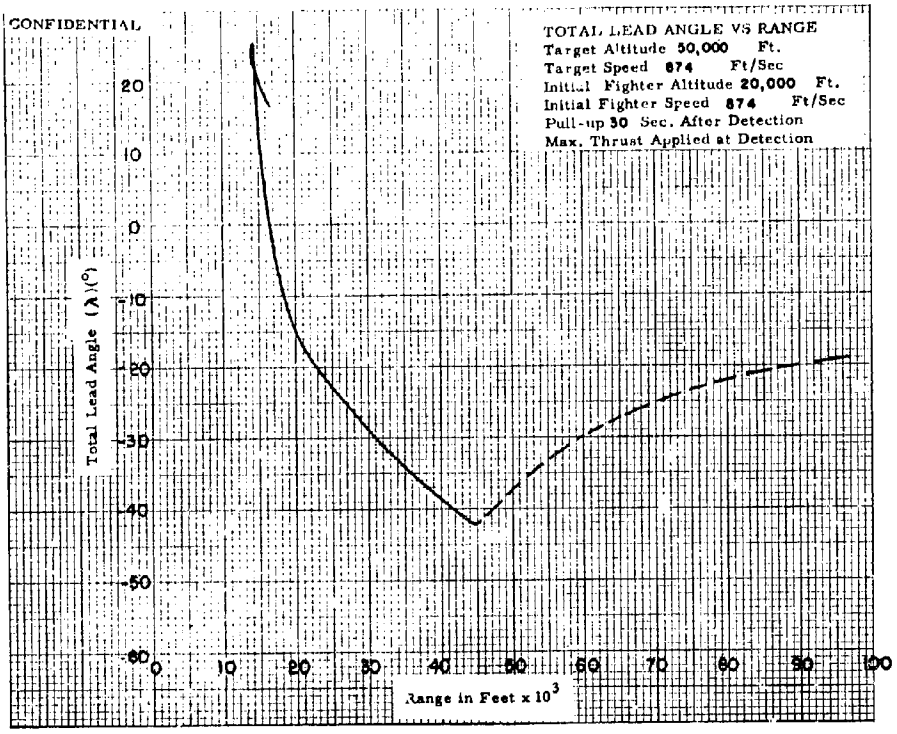

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λi(°)
30
20
10
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 593


TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
20
10
0
-10
-20
-30
-40
-50
-60
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

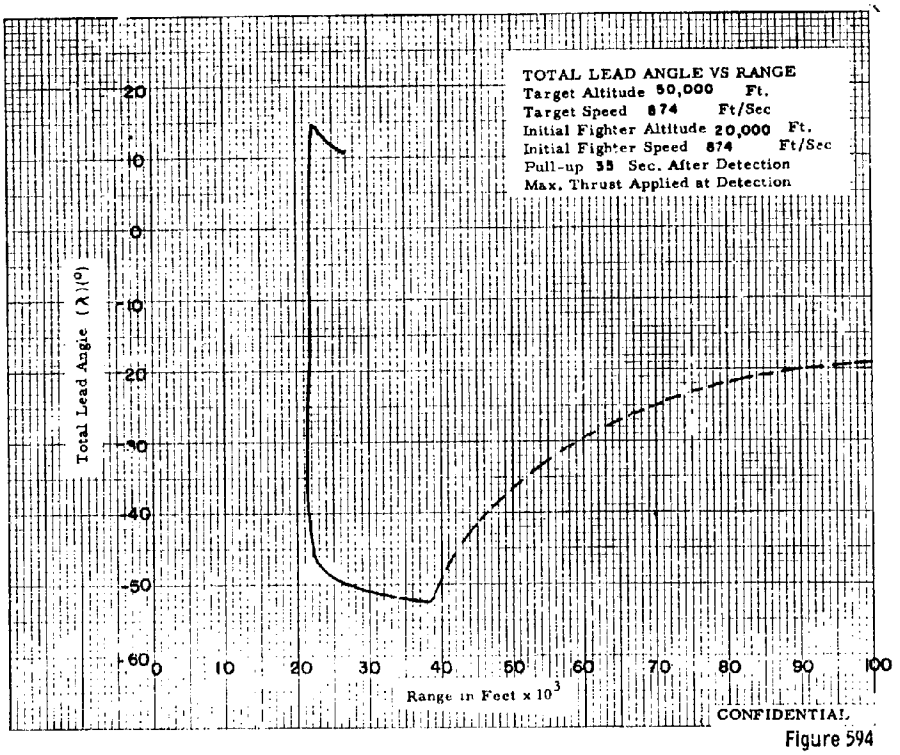
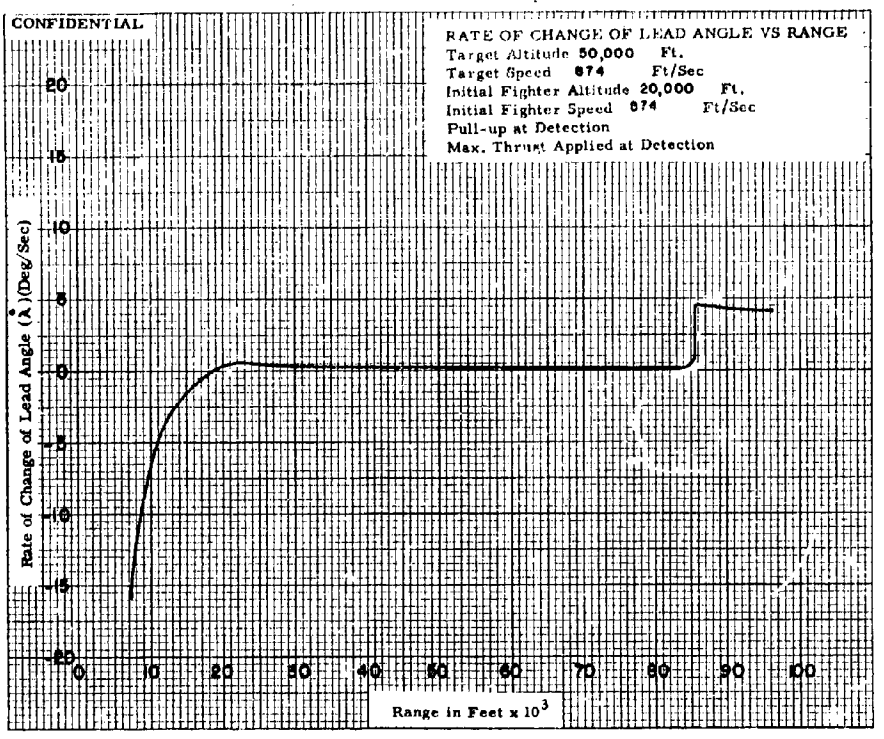

TOTAL LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
20
10
0
-10
-20
-30
-40
-50
-60
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

Figure 594


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
20
15
10
5
0
-5
-10
-15
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

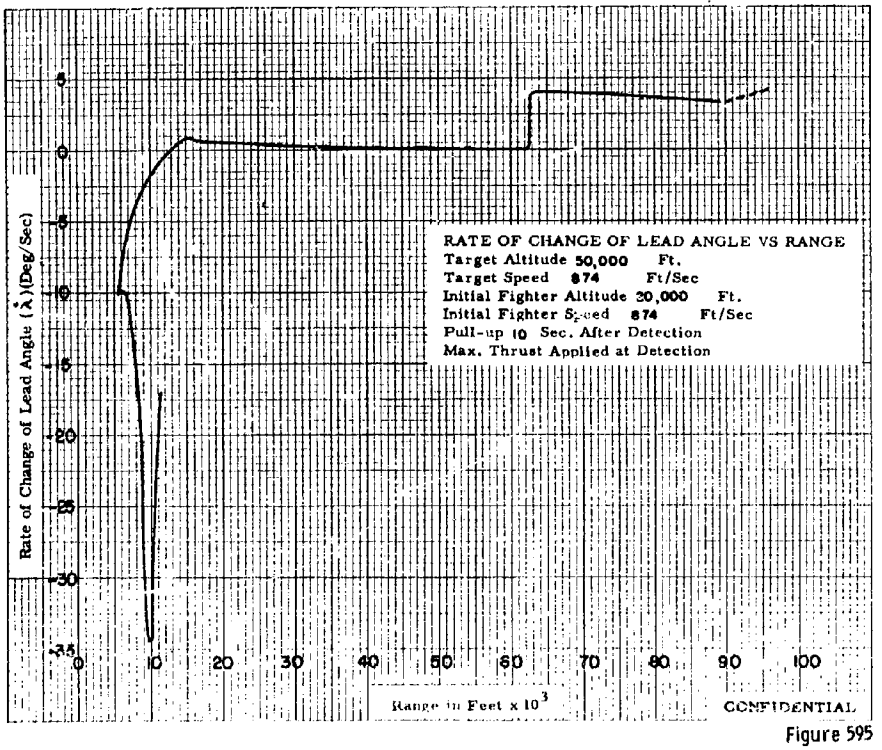
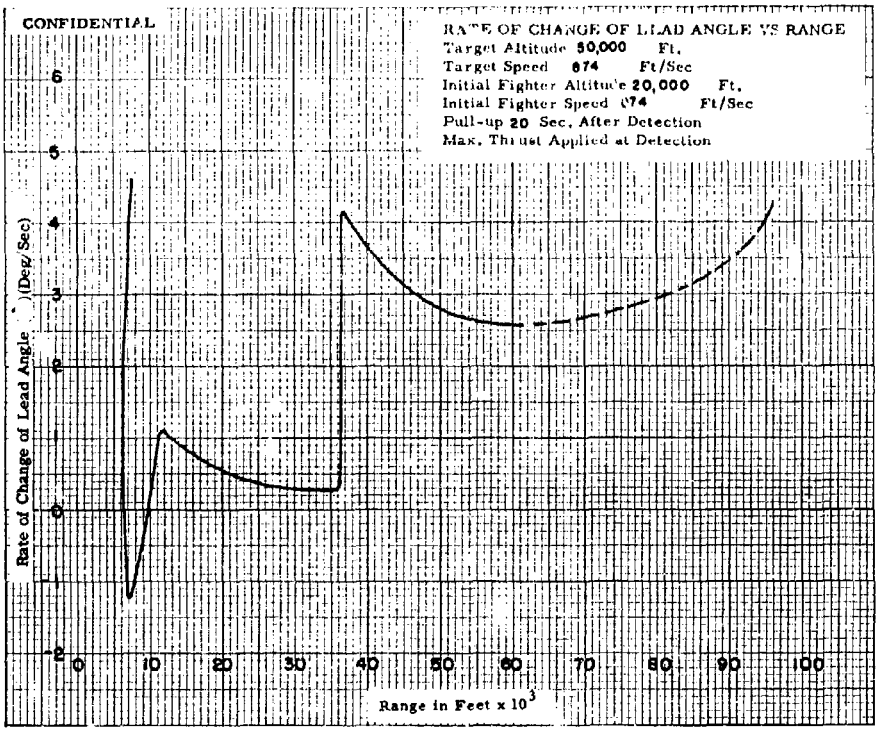

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
5
0
-5
-10
-15
-20
-25
-30
-35
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 595


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (Deg/Sec)
Range in Feet x 10³

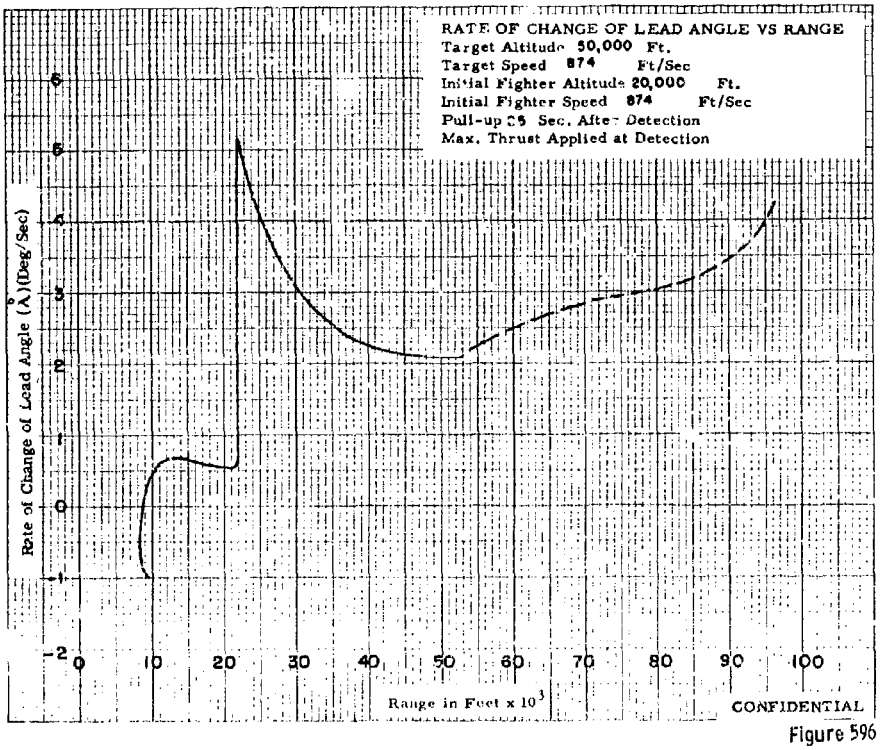
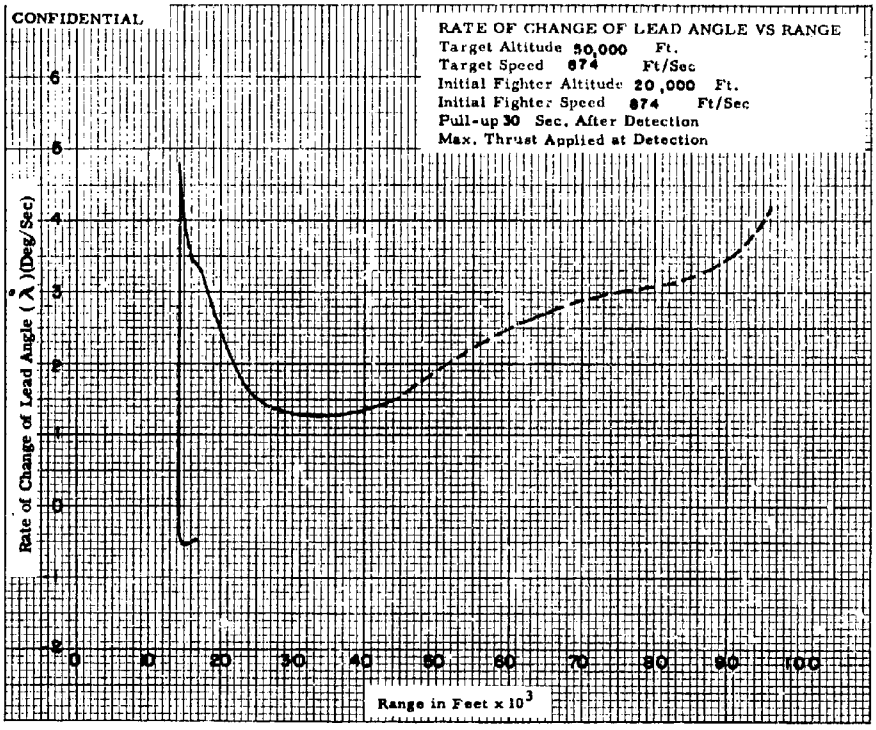

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 874 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 874 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (Deg/Sec)
Range in Feet x 10³
CONFIDENTIAL

Figure 596


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 674 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 674 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle ($\dot{\lambda}$) (Deg/Sec)
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

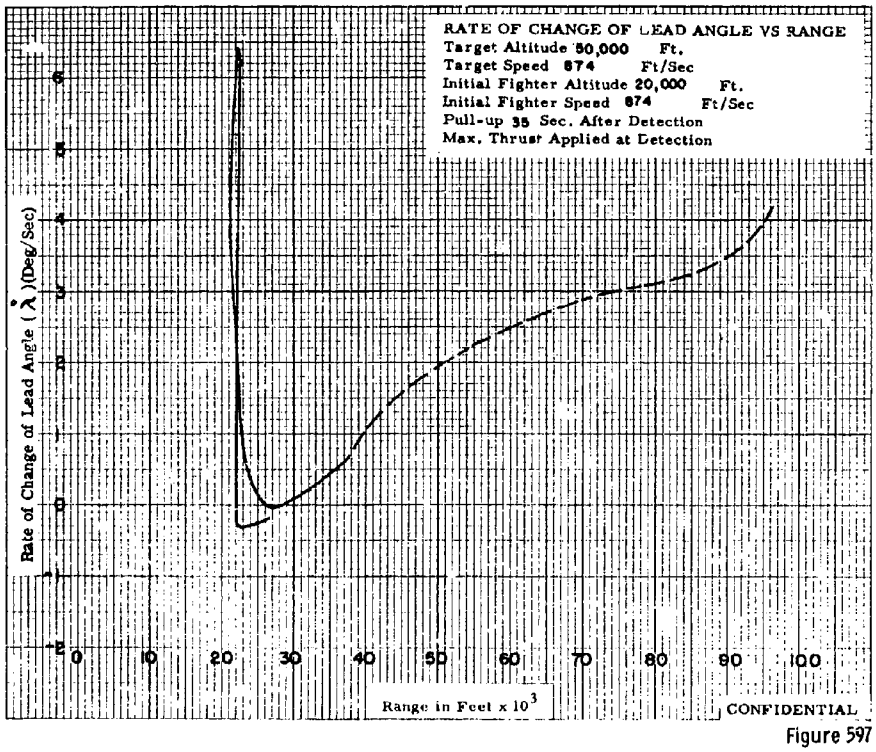
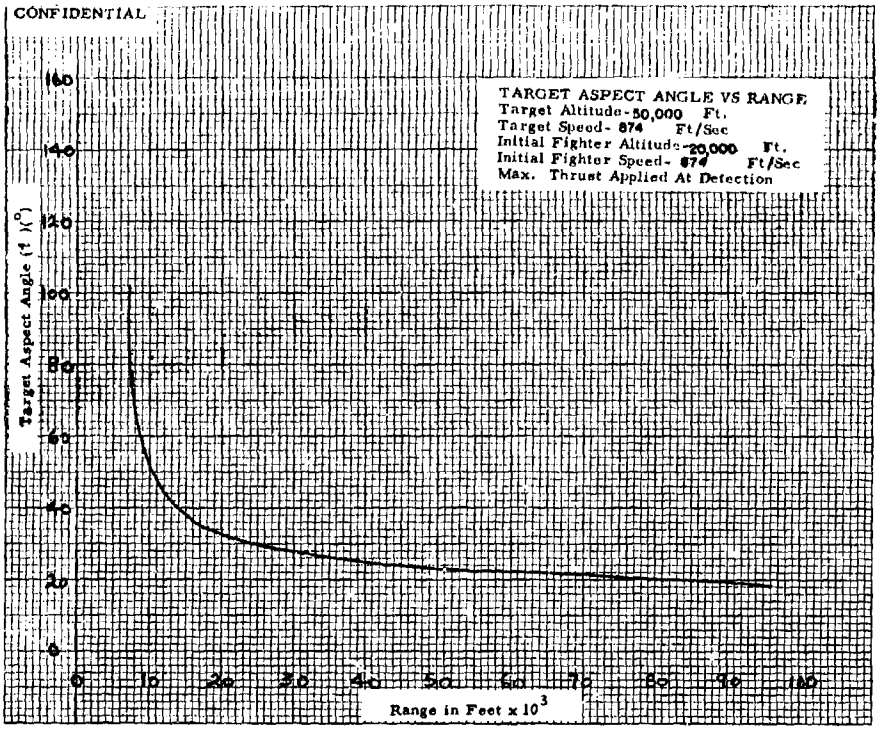
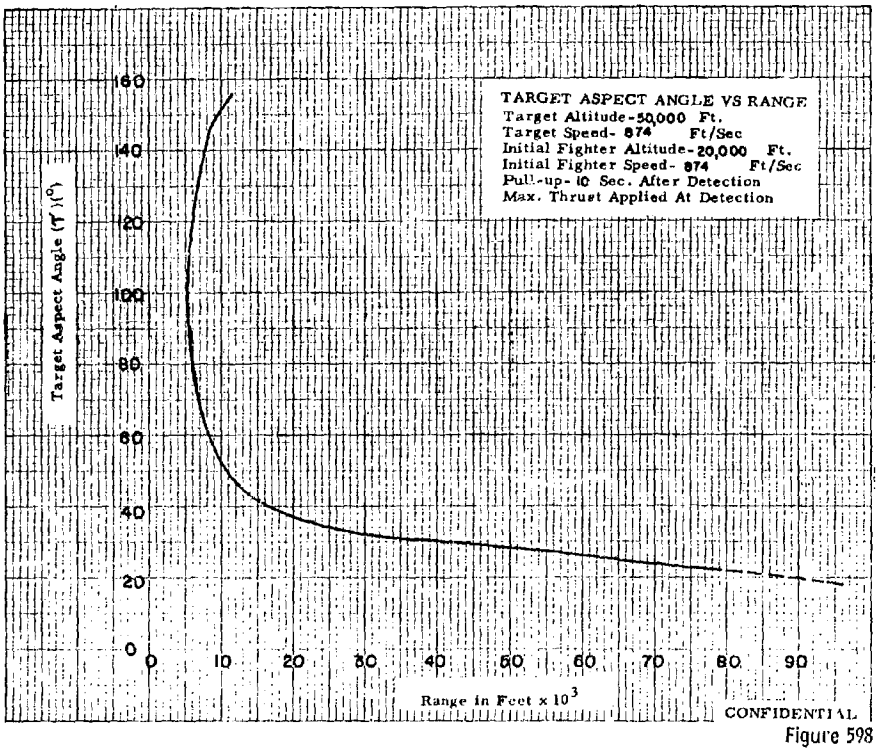

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 674 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 674 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle ($\dot{\lambda}$) (Deg/Sec)
6
5
4
3
2
1
0
-1
-2
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 597

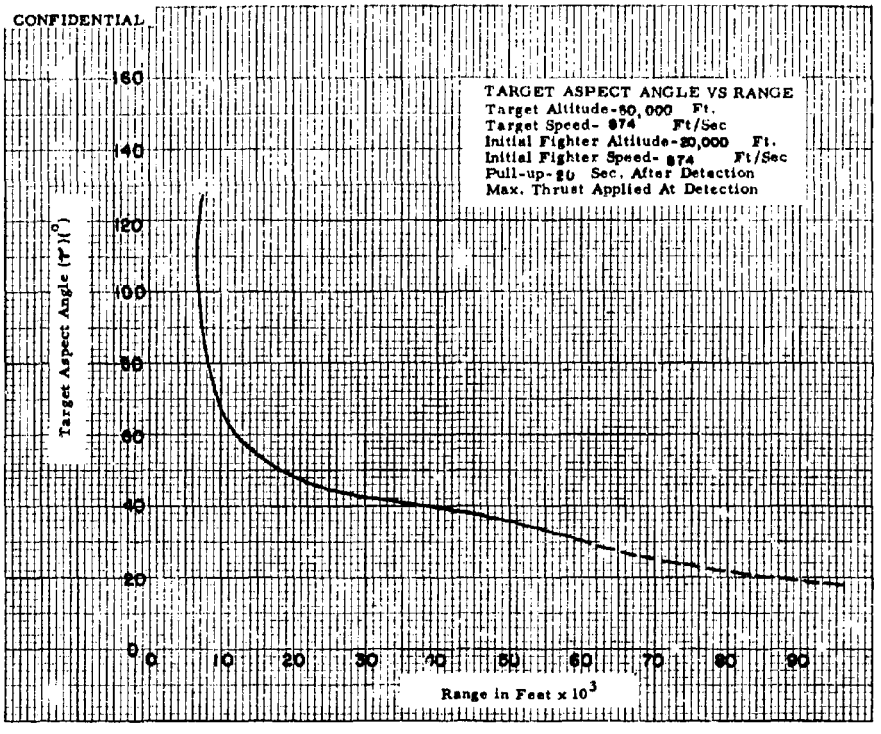
CONFIDENTIAL





CONFIDENTIAL

Figure 598


TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up-20 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ΨT)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10³

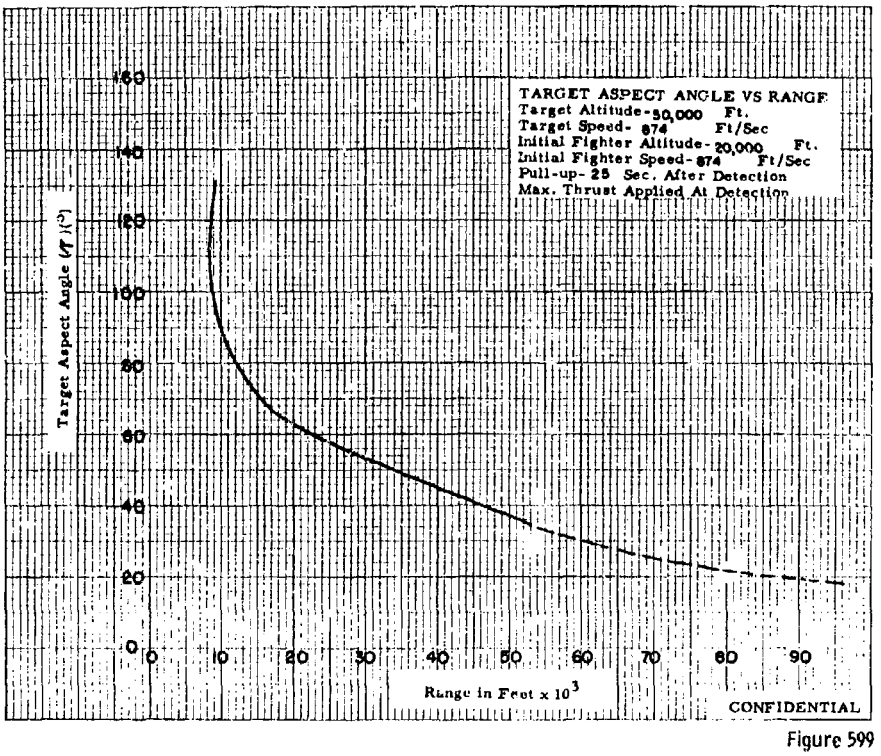
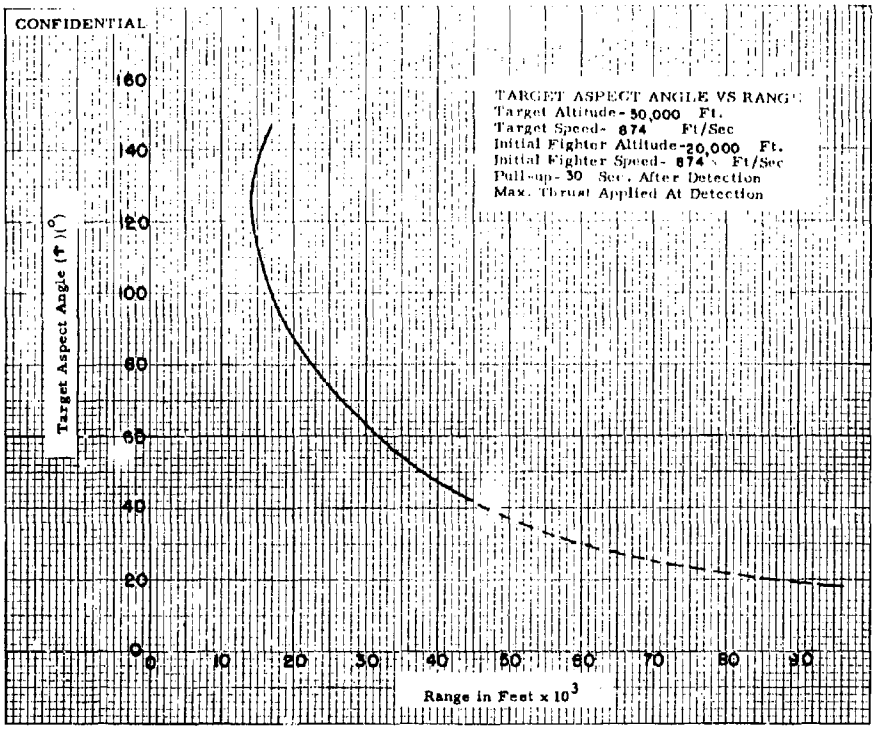

TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed-874 Ft/Sec
Pull-up- 25 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (ΨT)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10³
CONFIDENTIAL

Figure 599


TARGET ASPECT ANGLE VS RANGE
Target Altitude- 50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 30 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (Ψ) (°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10³

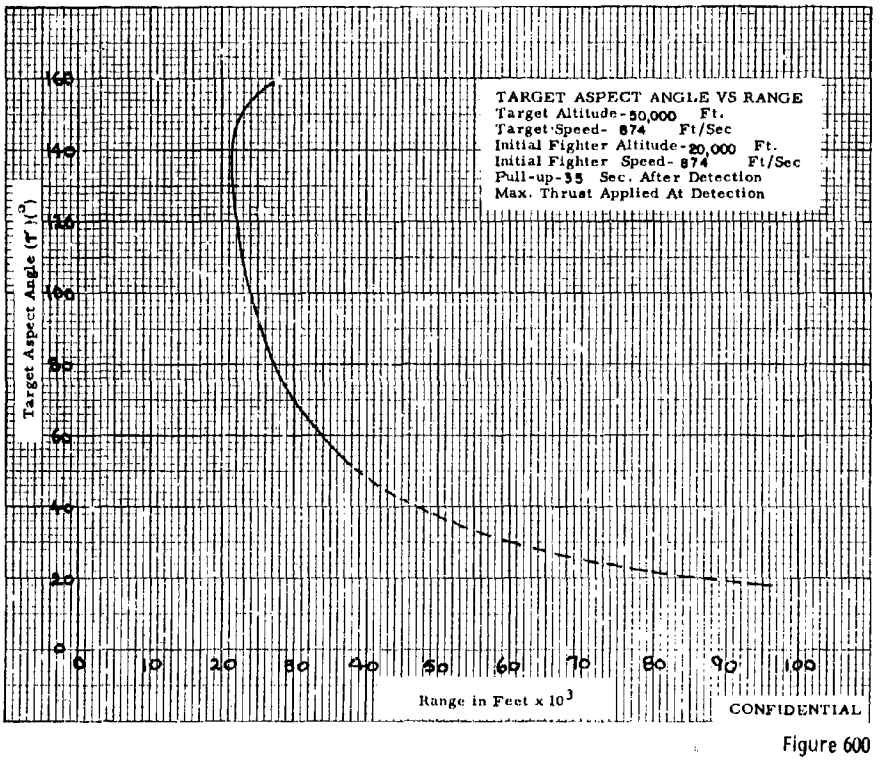
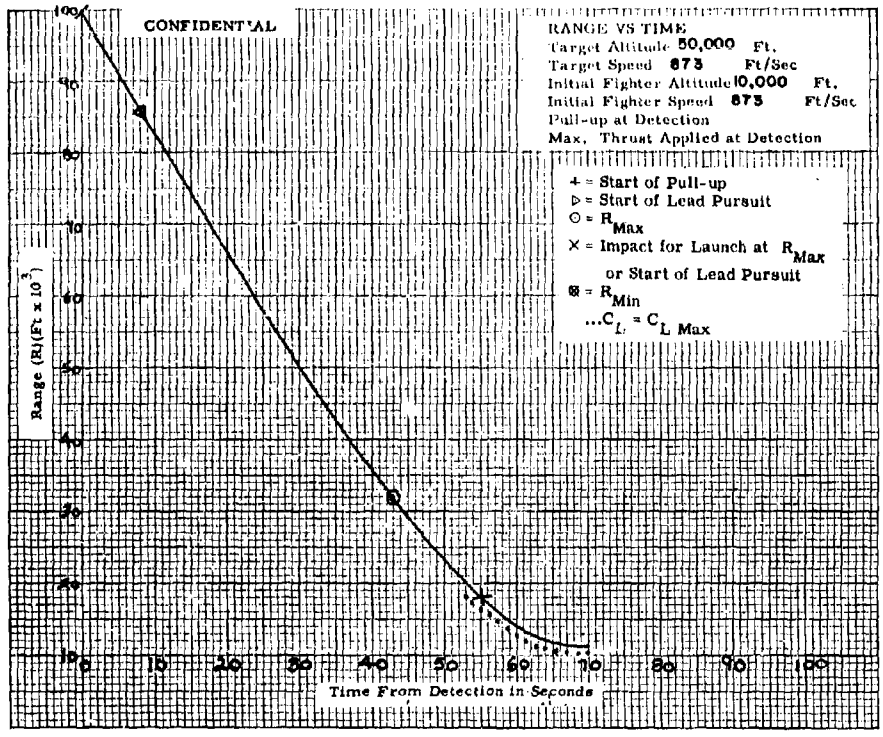

TARGET ASPECT ANGLE VS RANGE
Target Altitude- 50,000 Ft.
Target Speed- 874 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 874 Ft/Sec
Pull-up- 55 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (Ψ) (°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 600


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min
...C L = C L Max
Range (R)(Ft x 10³)
Time From Detection in Seconds

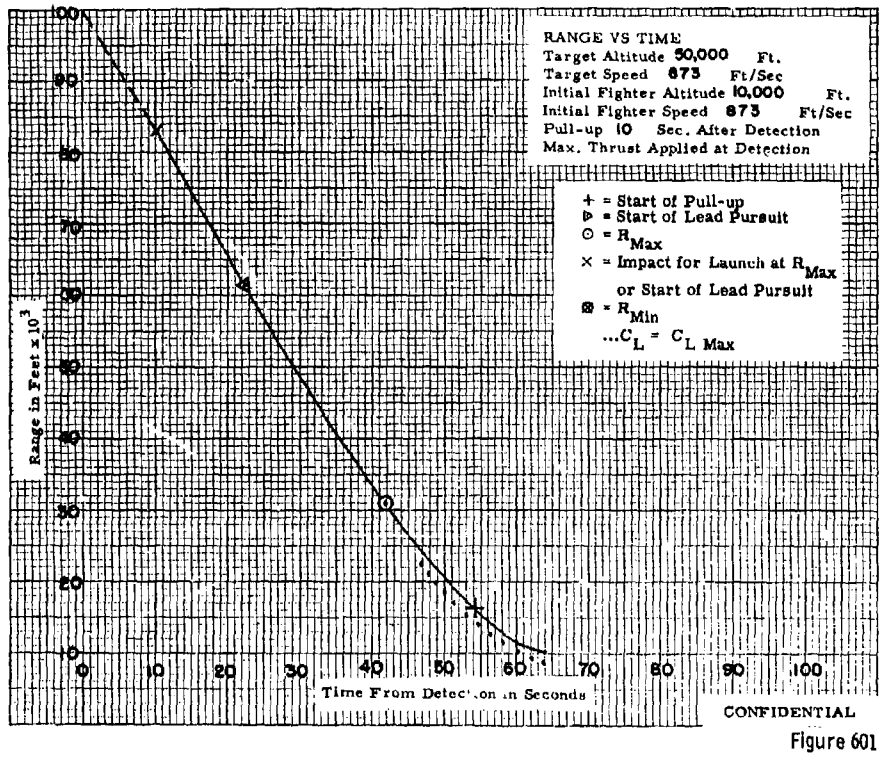
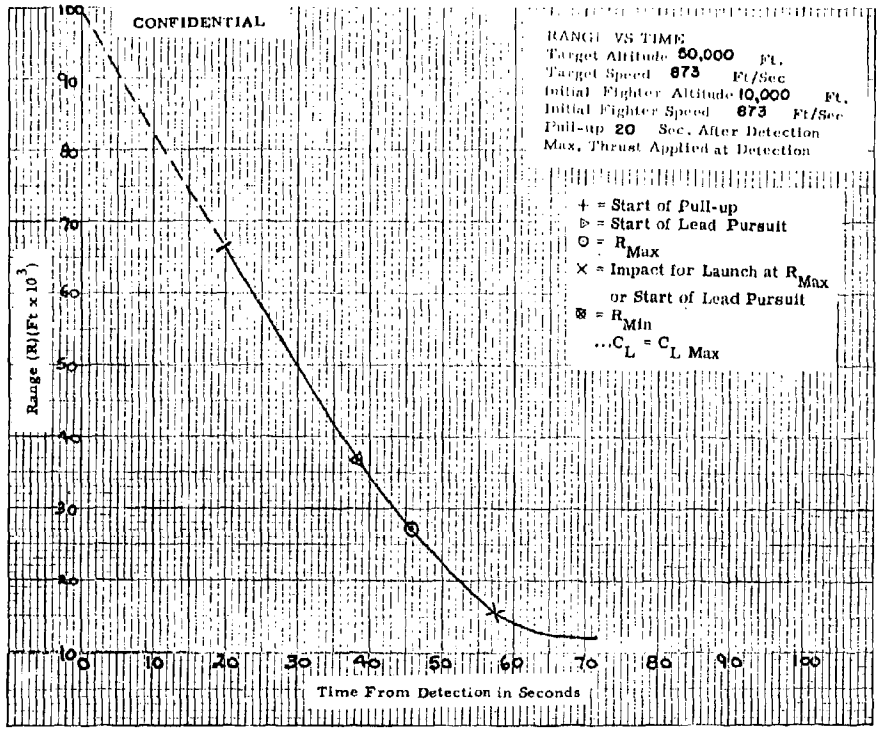

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min
...C L = C L Max
Range in Feet x 10³
Time From Detection in Seconds
CONFIDENTIAL

Figure 601


CONFIDENTIAL
RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

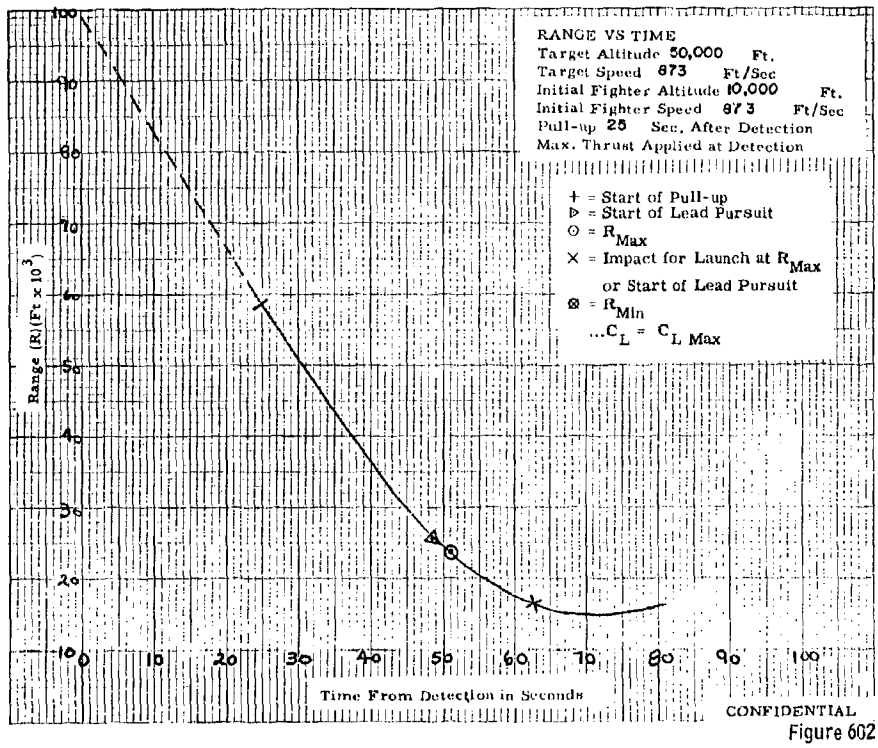
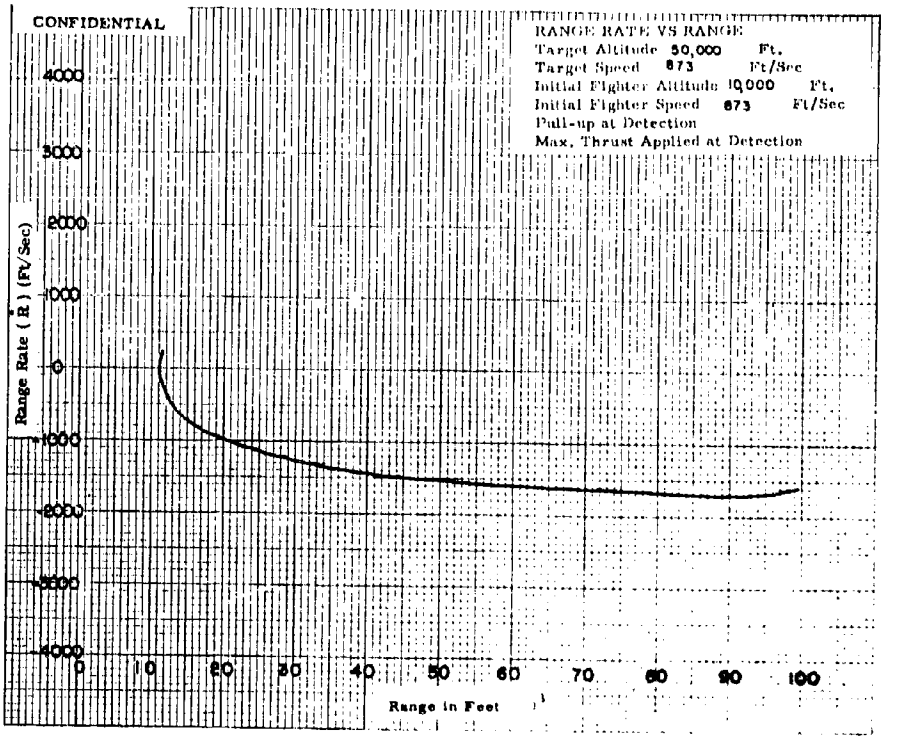

RANGE VS TIME
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 602


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet

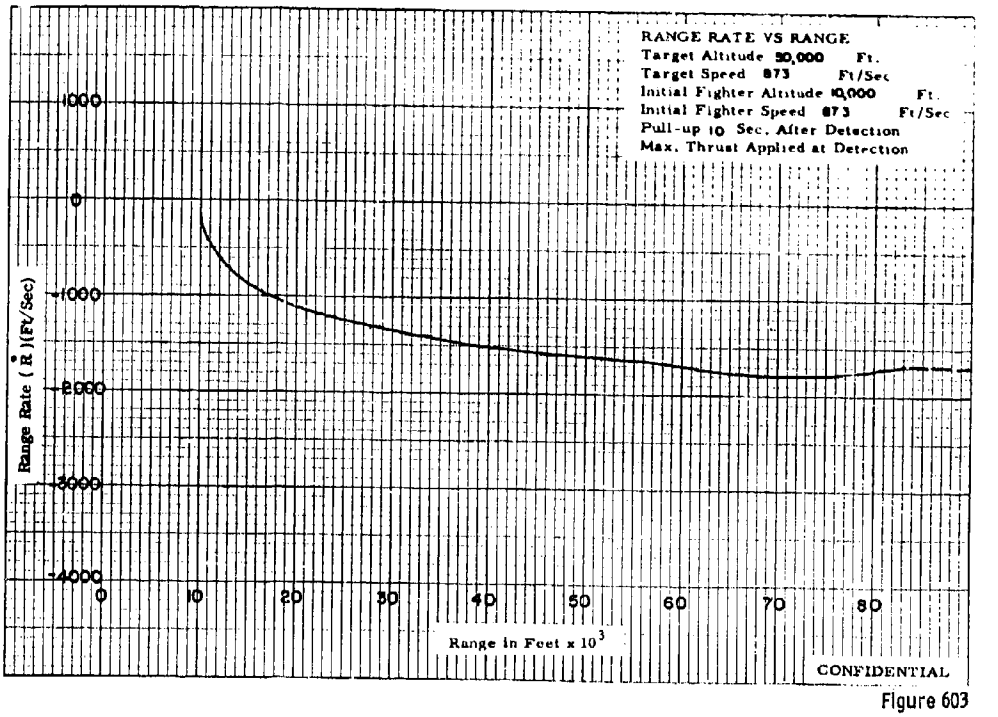
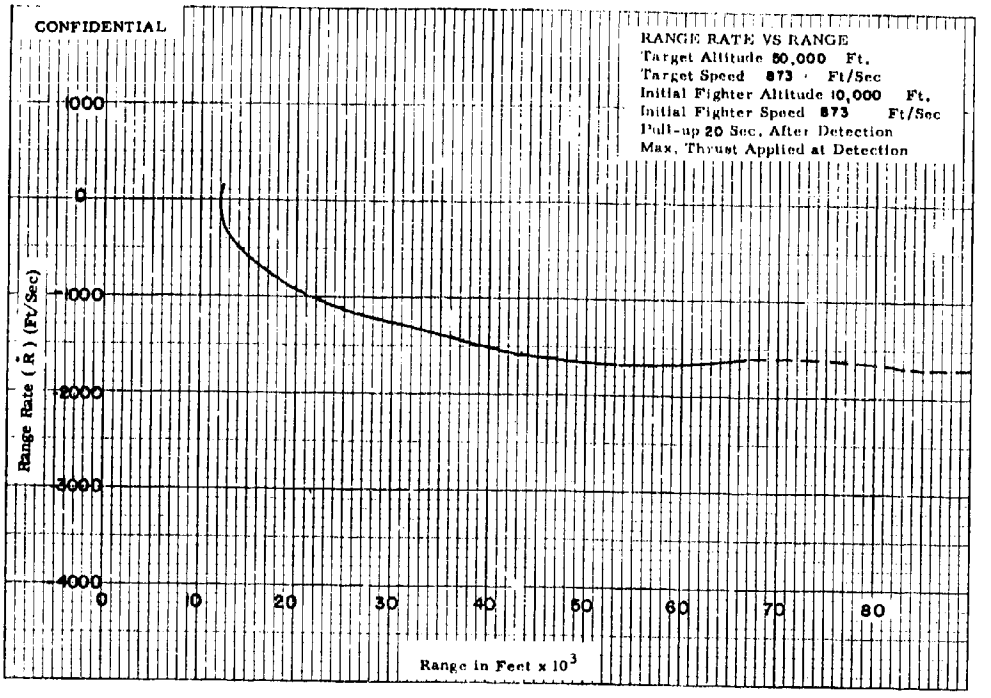

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 603


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

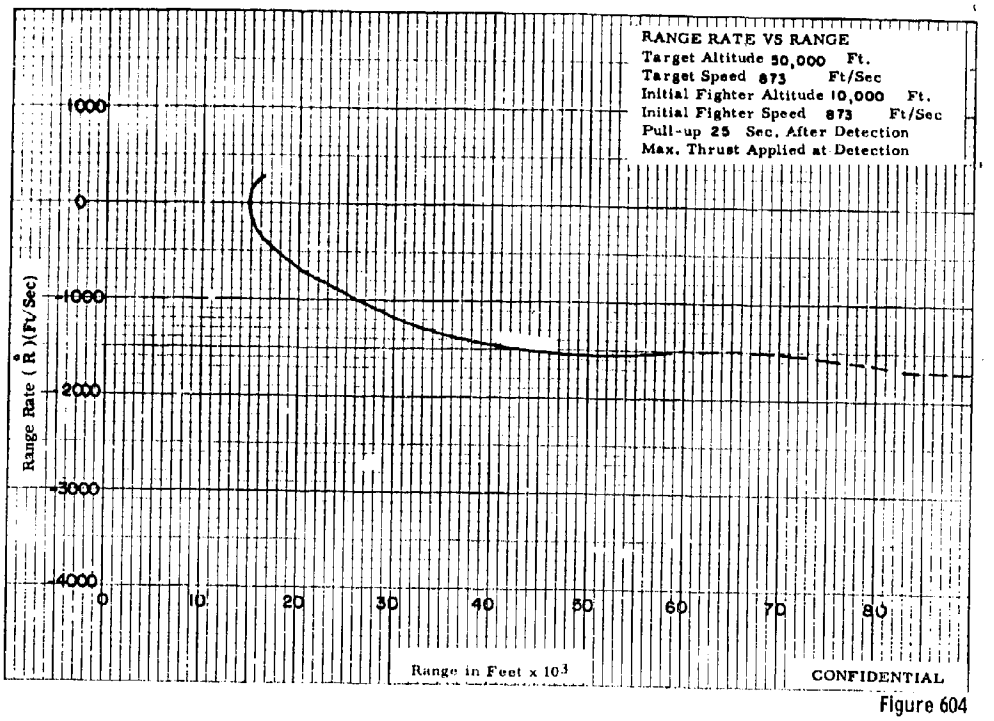
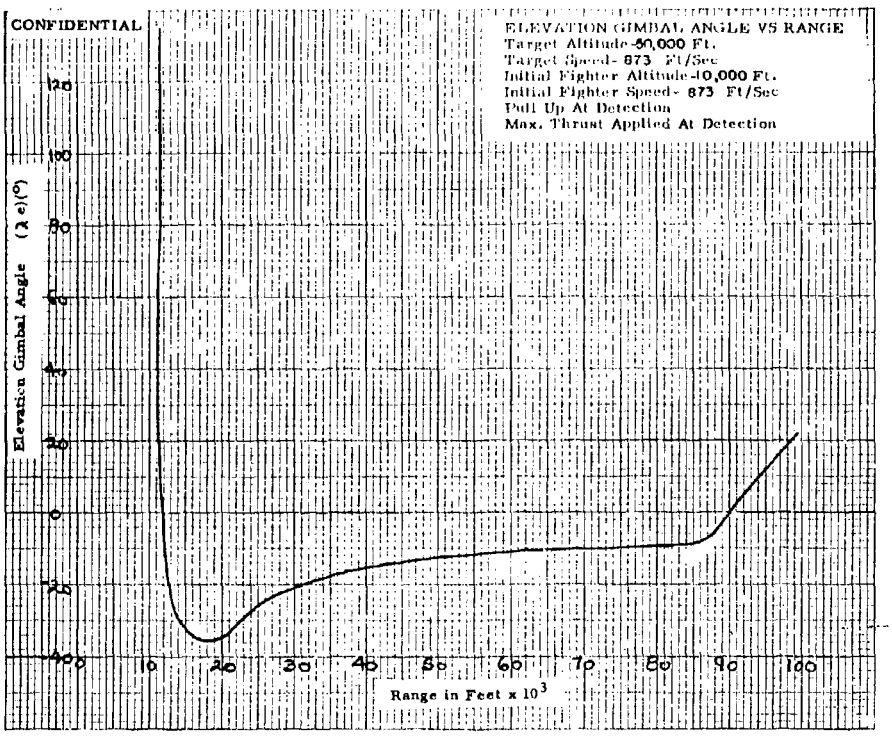

RANGE RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 604


CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull Up At Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
Range in Feet x 10³

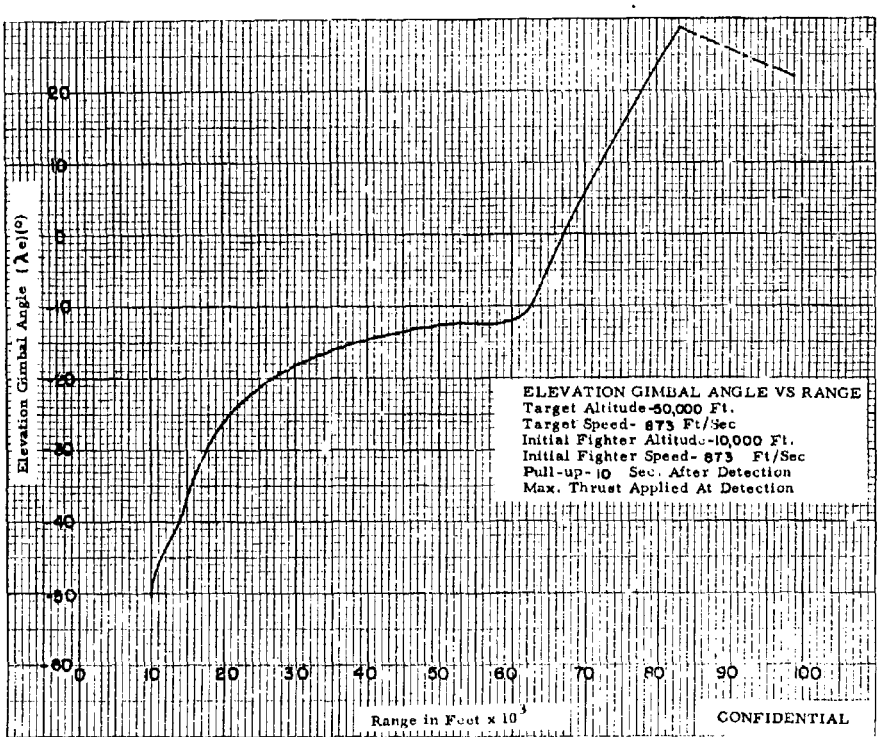
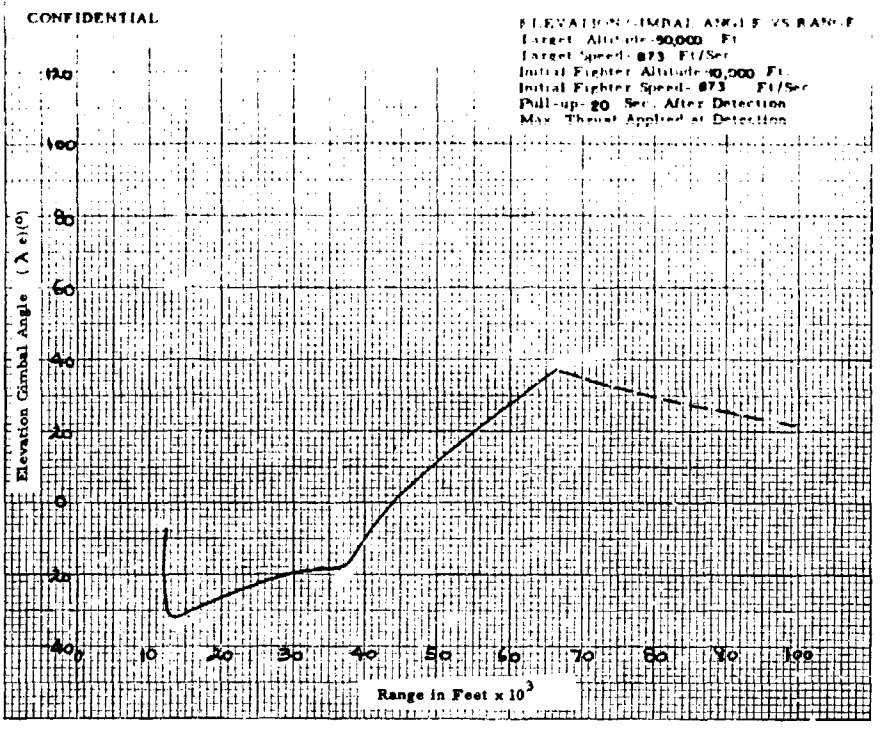

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
Range in Feet x 10³
CONFIDENTIAL

Figure 605


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Gimbal Angle (λe)(°)
120
100
80
60
40
20
0
-20
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

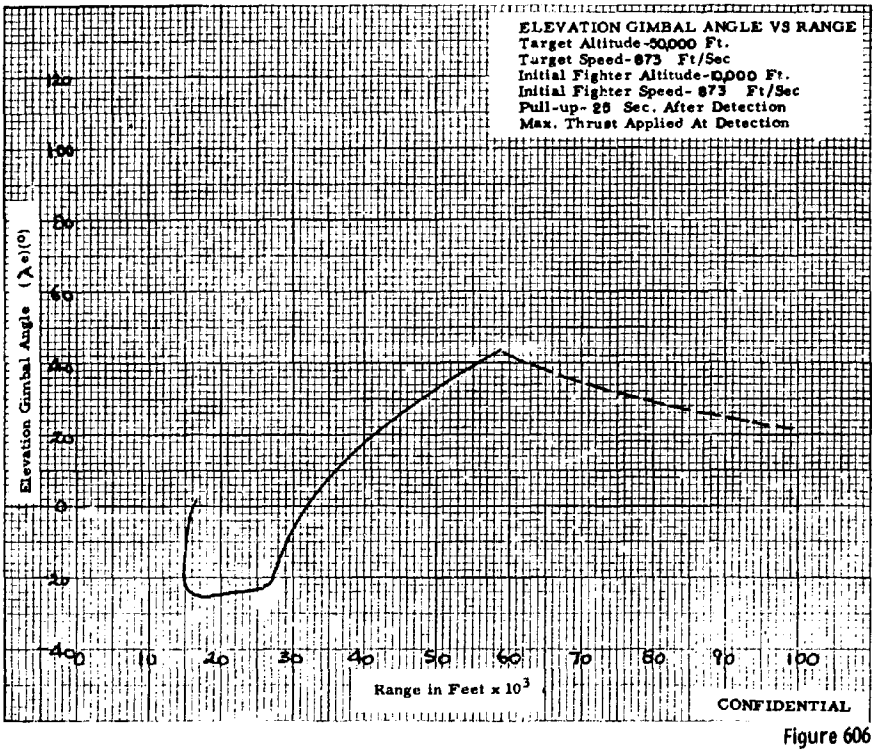
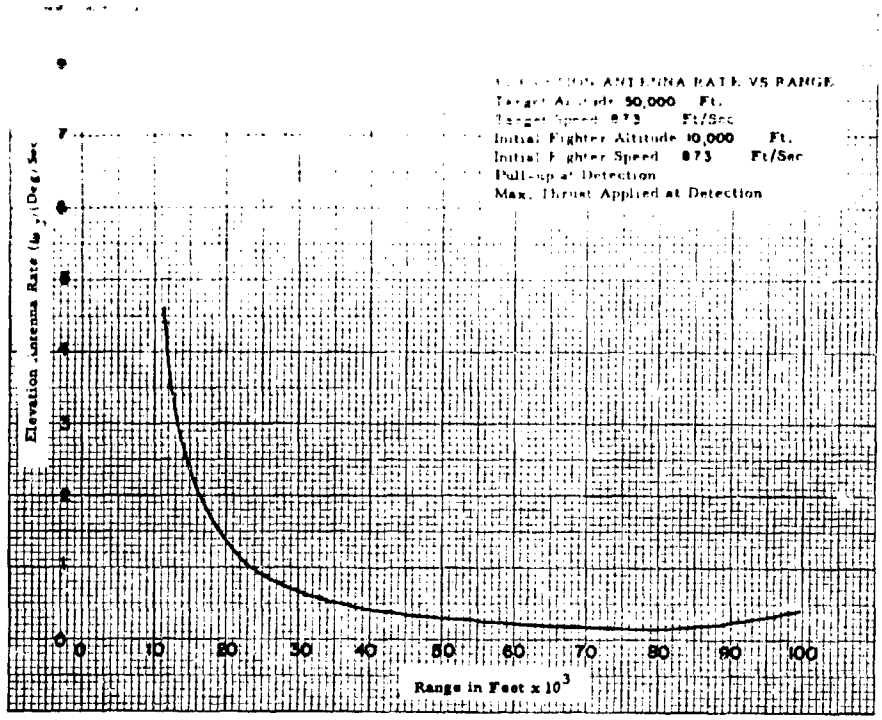

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed-873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 25 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
120
100
80
60
40
20
0
-20
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 606


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (dε/dt)Deg/Sec
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

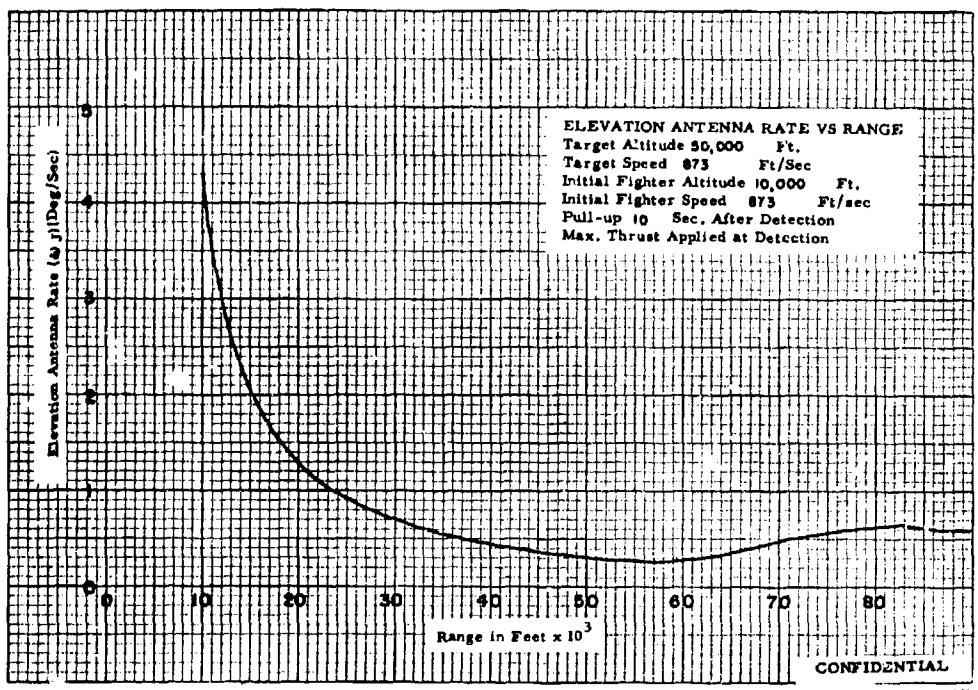
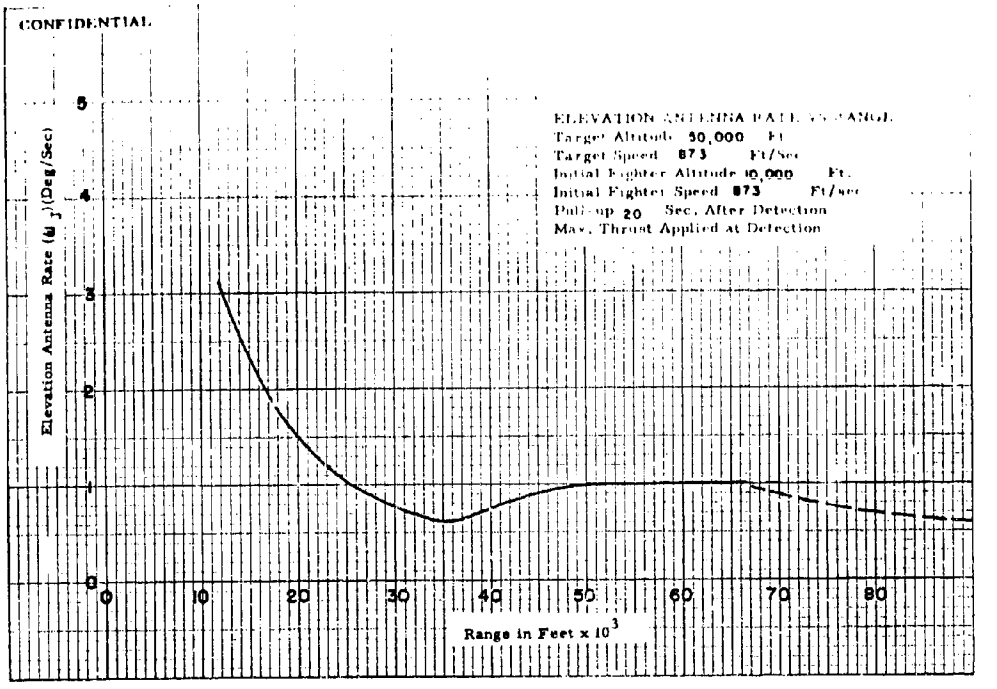

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (dε/dt)Deg/Sec
0 10 20 30 40 50 60 70 80
Range in Feet x 10^3
CONFIDENTIAL

Figure 607


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_J)(Deg/Sec)
0
1
2
3
4
5
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

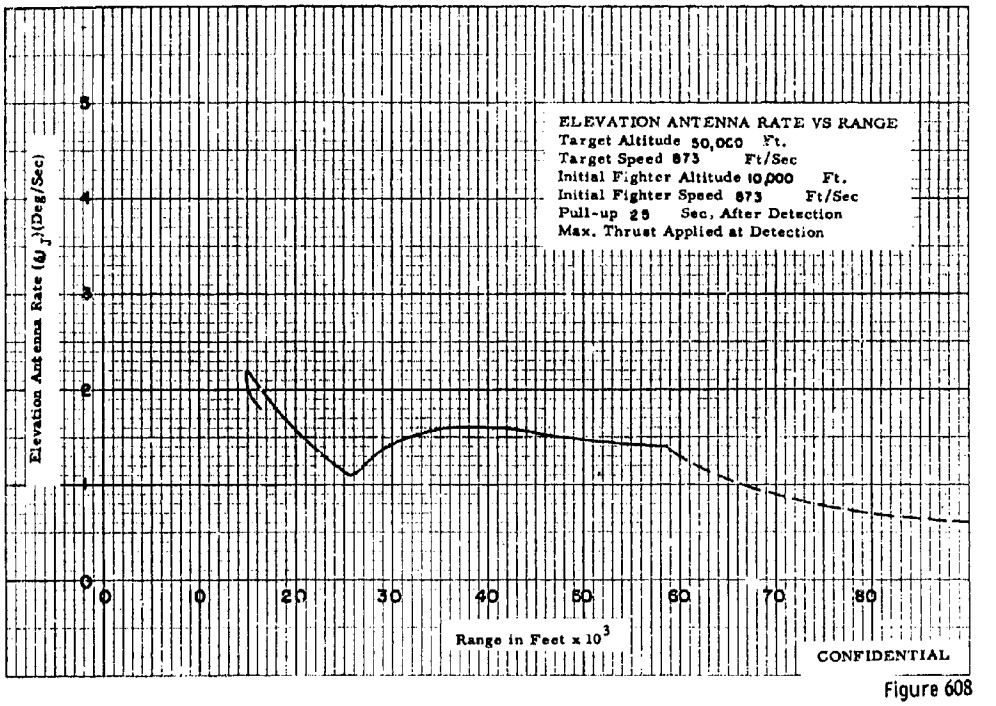
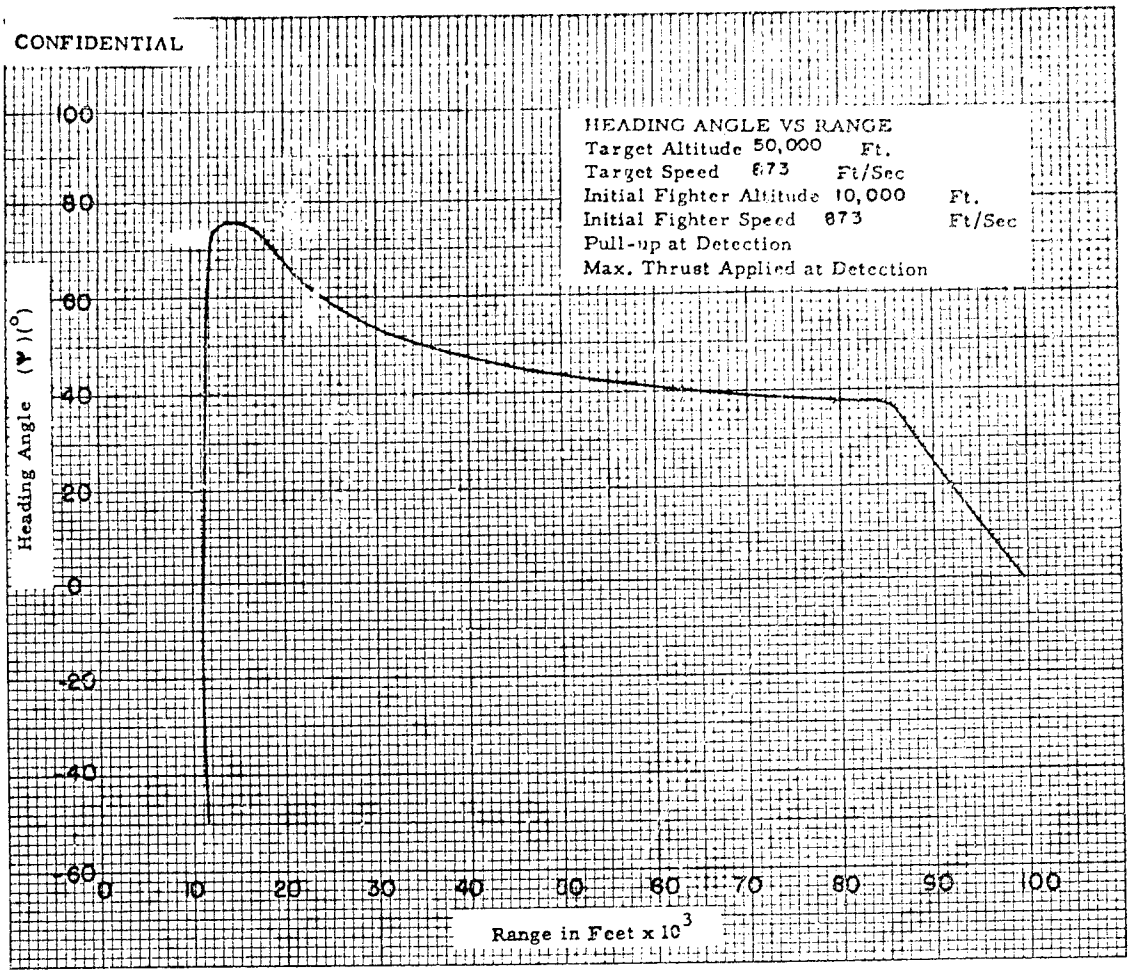

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 25 Sec, After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_J)(Deg/Sec)
0
1
2
3
4
5
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 608


HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Heading Angle (Ψ)(°)
100
80
60
40
20
0
-20
-40
-60
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

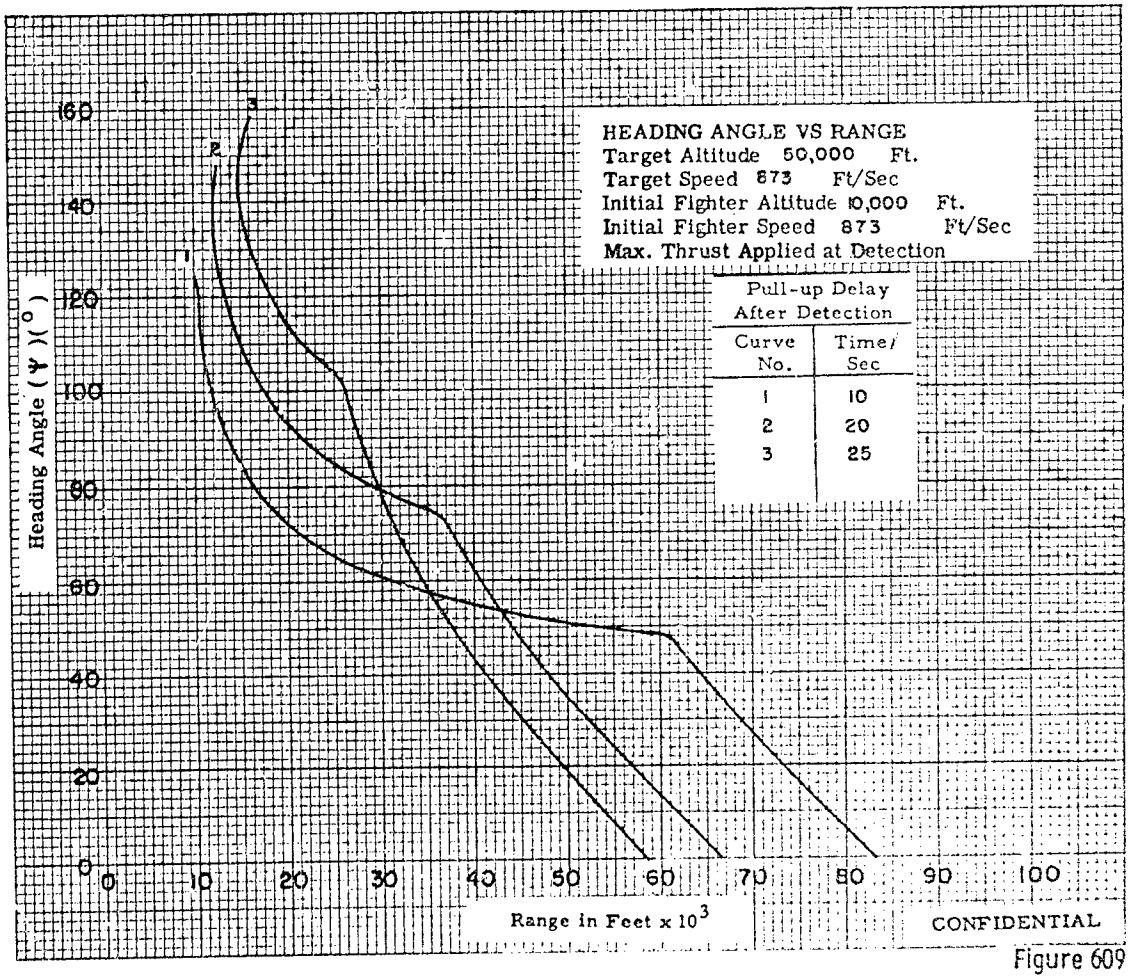
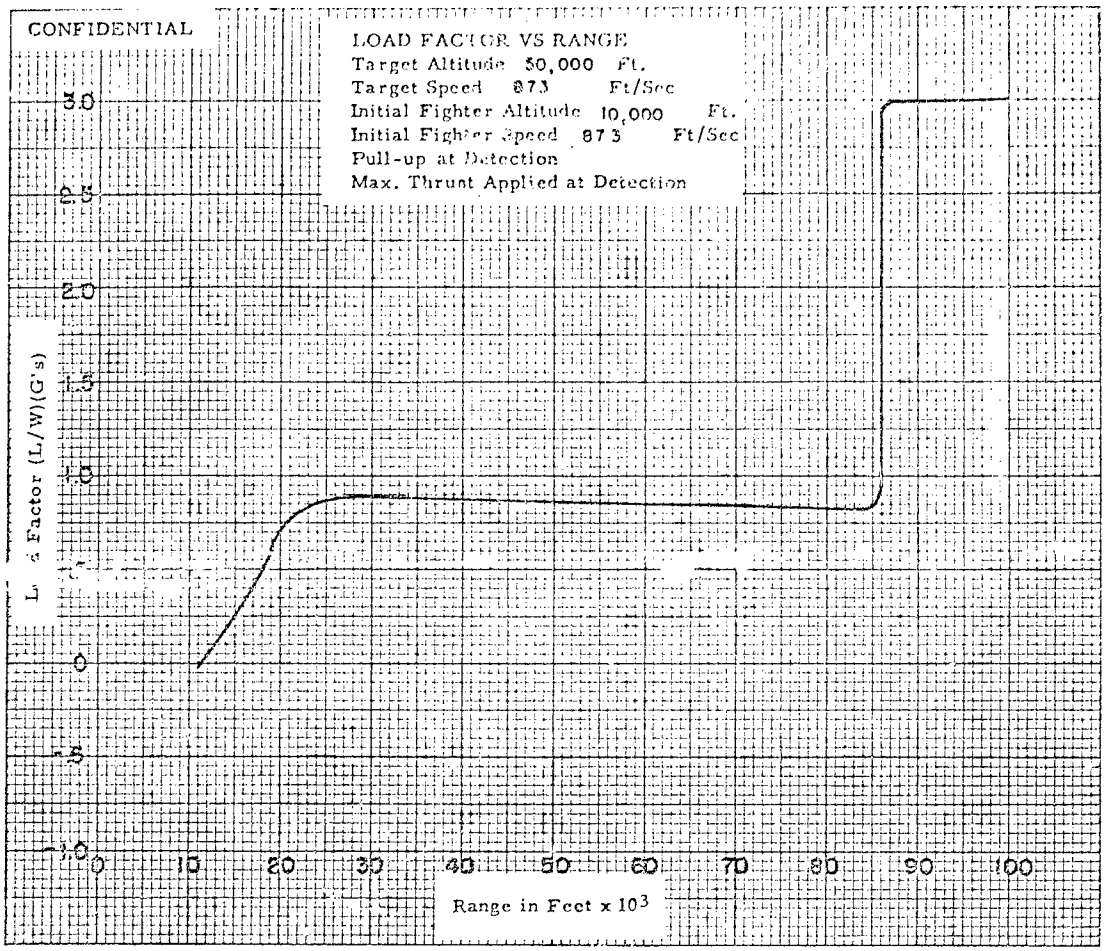

HEADING ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 10
2 | 20
3 | 25
Heading Angle (Ψ)(°)
160
140
120
100
80
60
40
20
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 609


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
3.0
2.5
2.0
1.5
1.0
0
-.5
-1.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

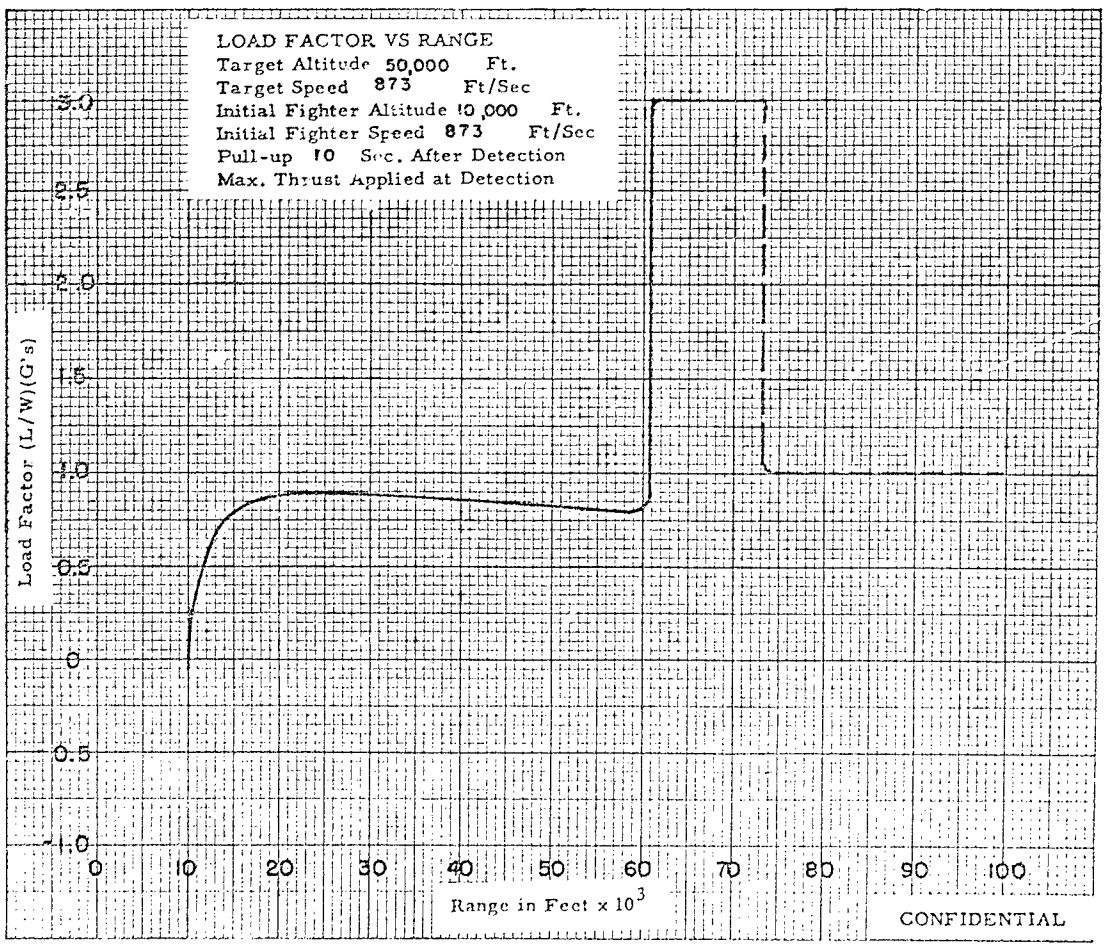
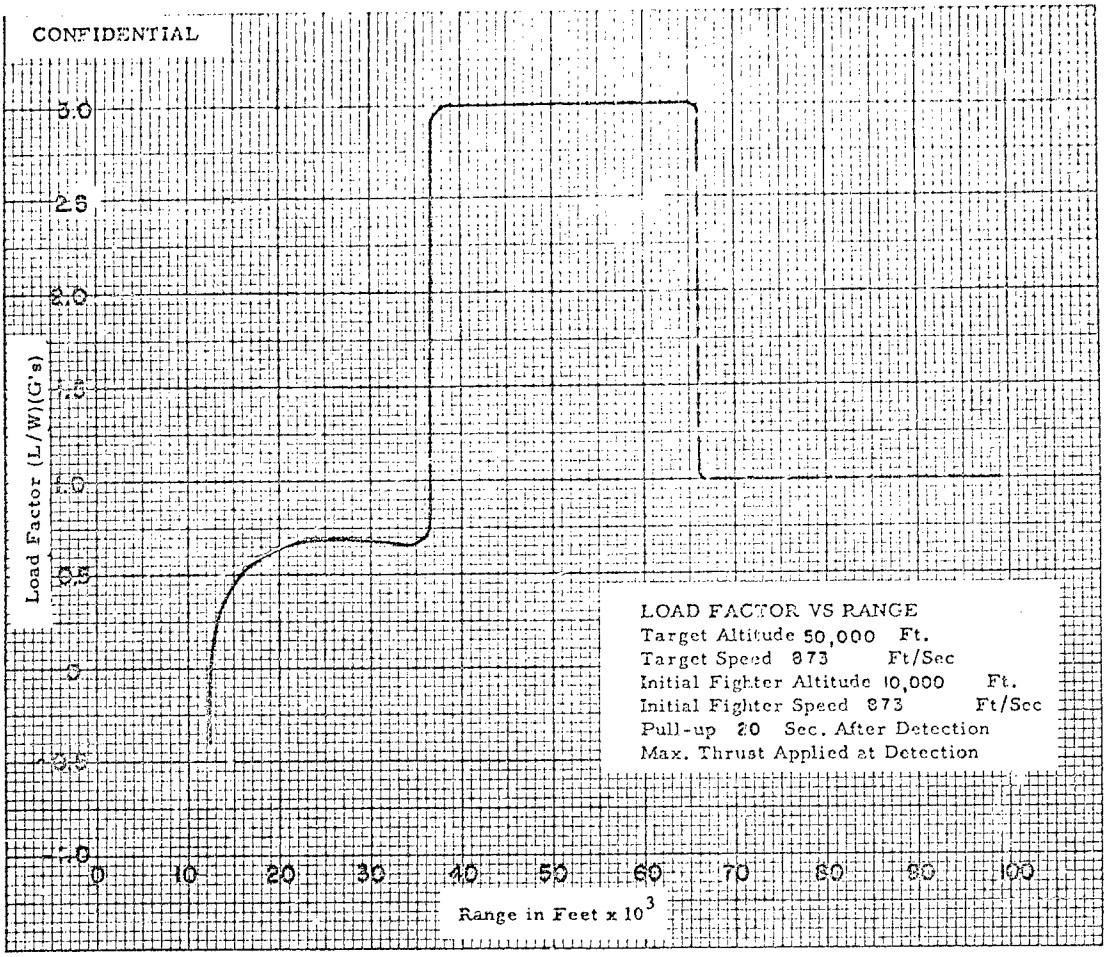

LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 610


3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
Load Factor (L/W)(G's)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection

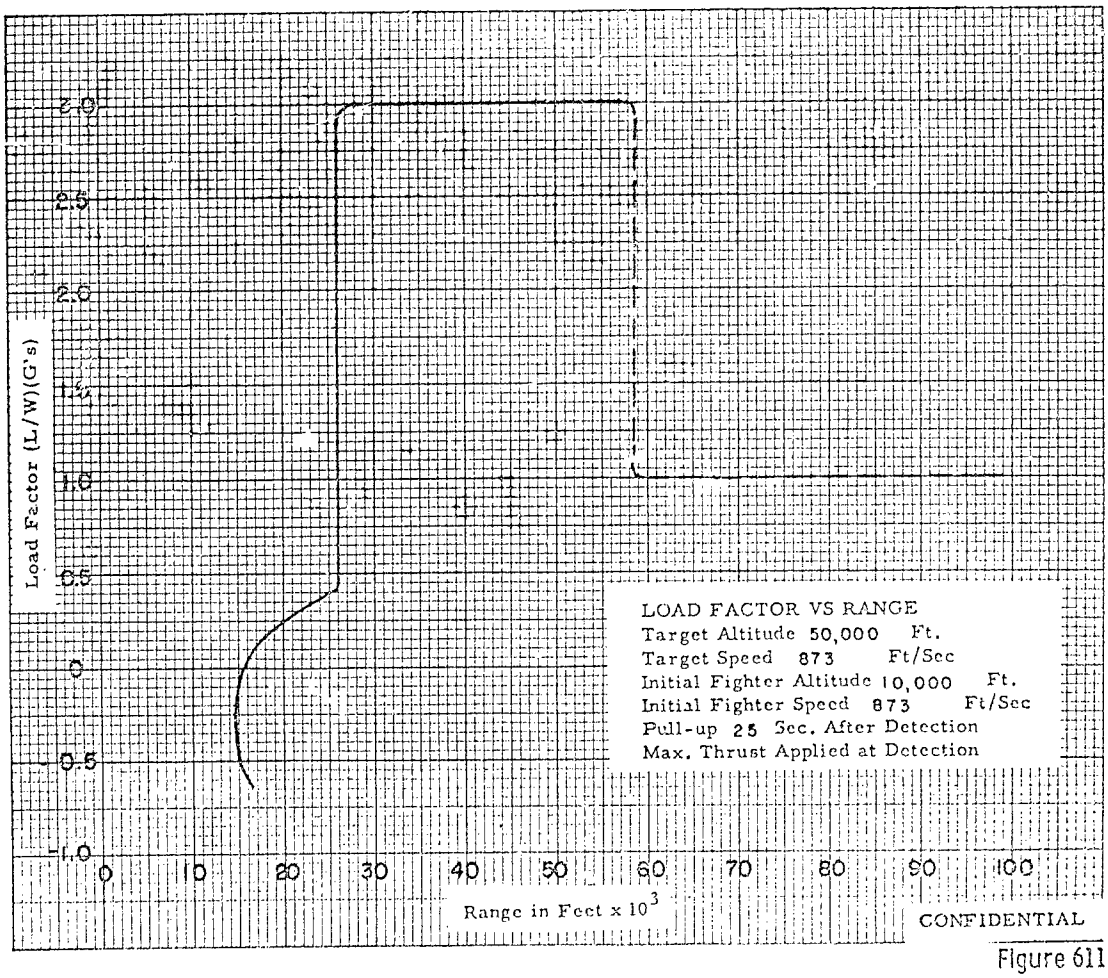
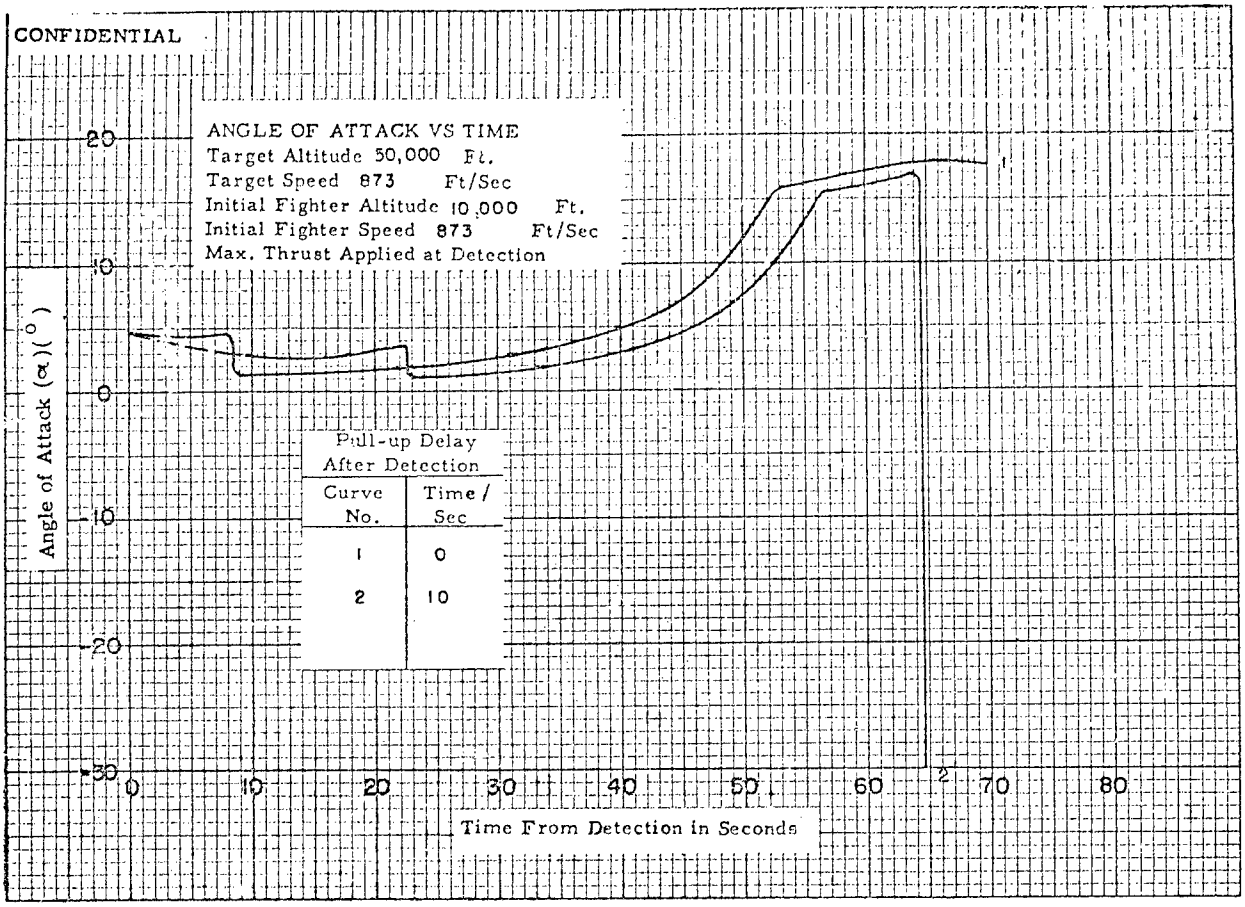
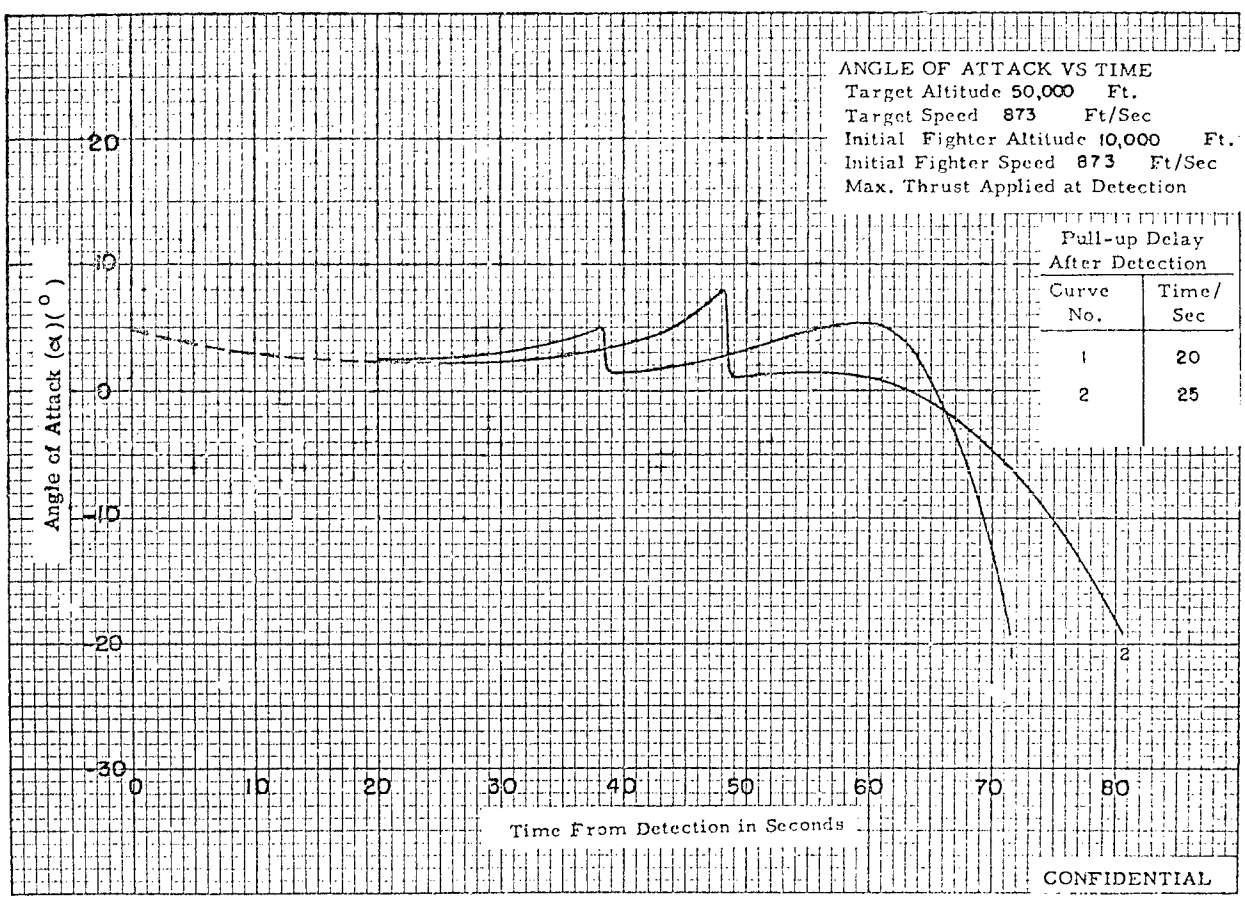

3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
Load Factor (L/W)(G's)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
LOAD FACTOR VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection

Figure 611

CONFIDENTIAL





CONFIDENTIAL

Figure 612

CONFIDENTIAL

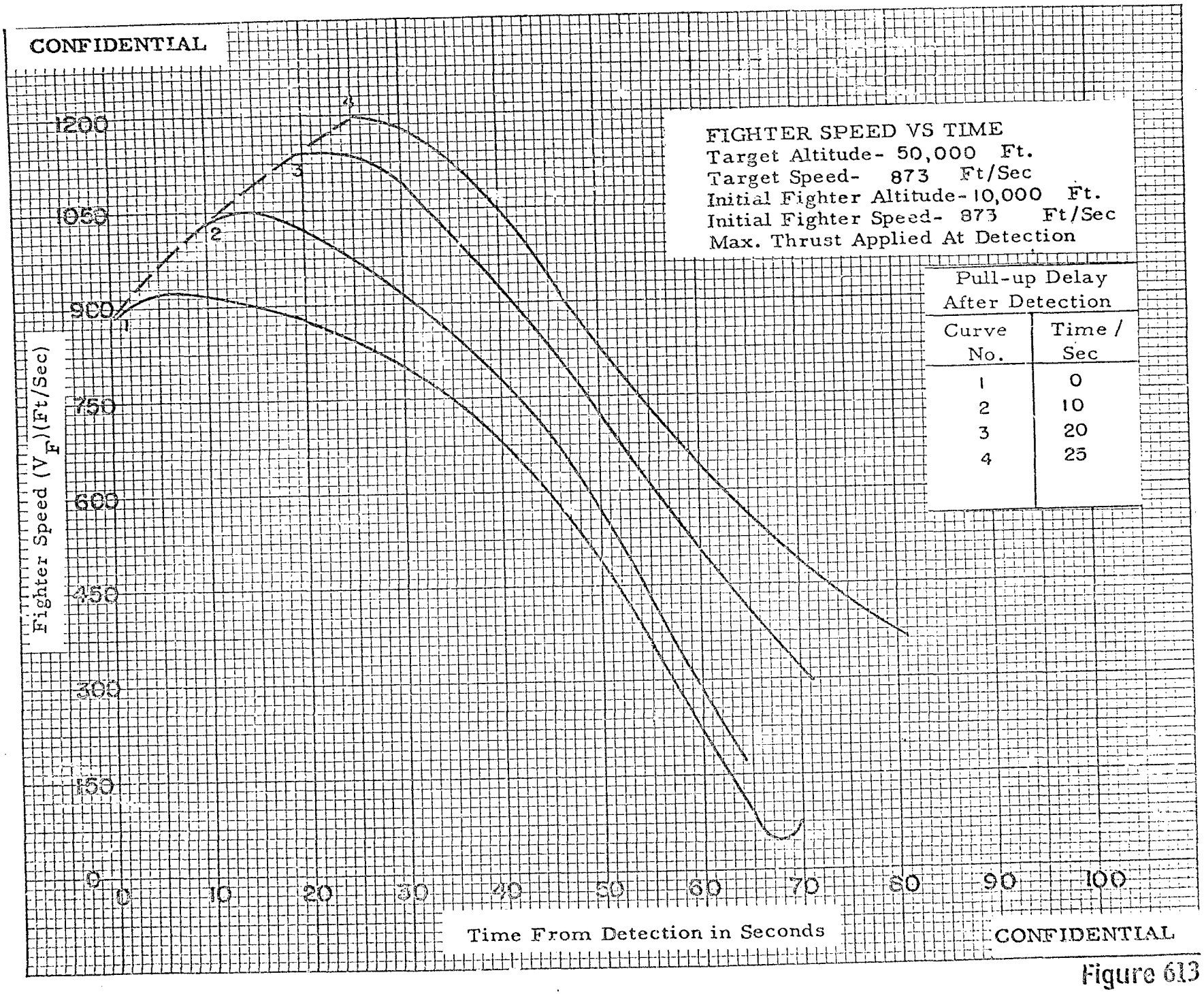
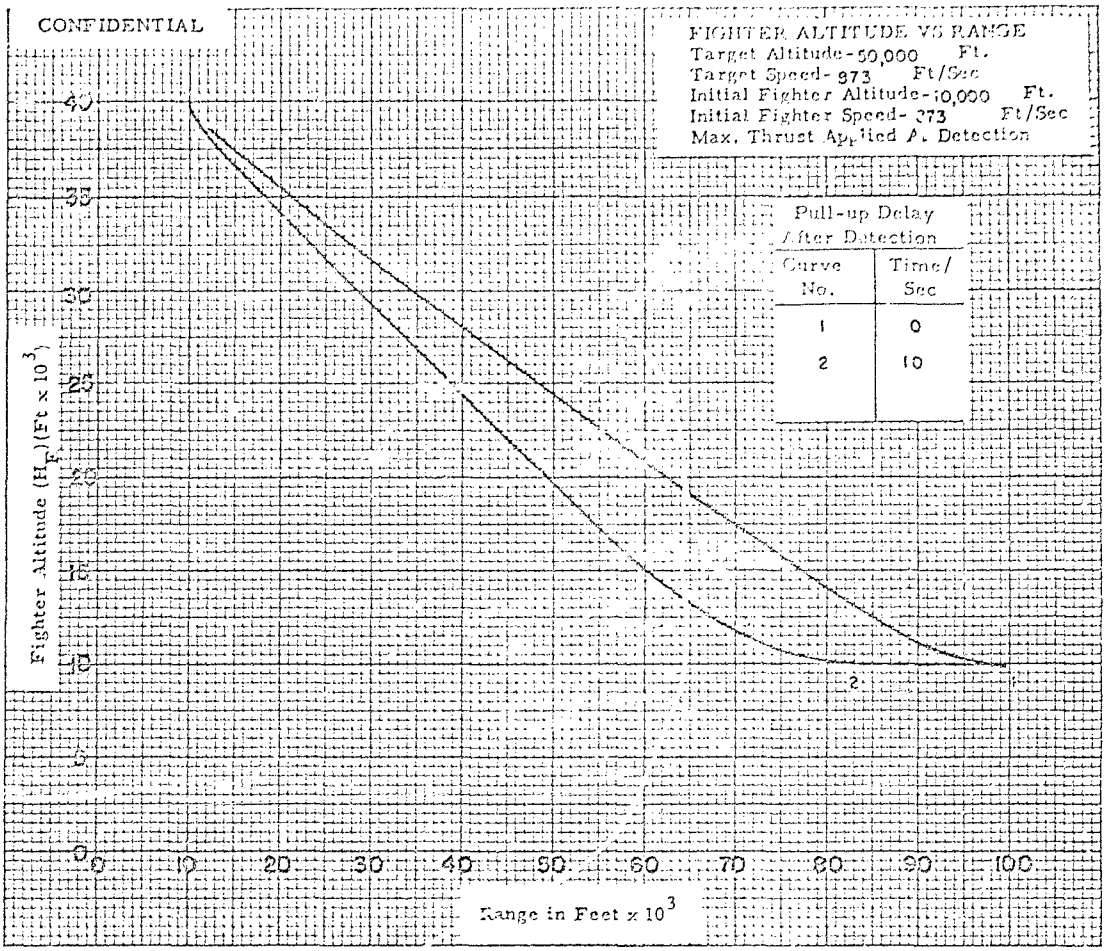
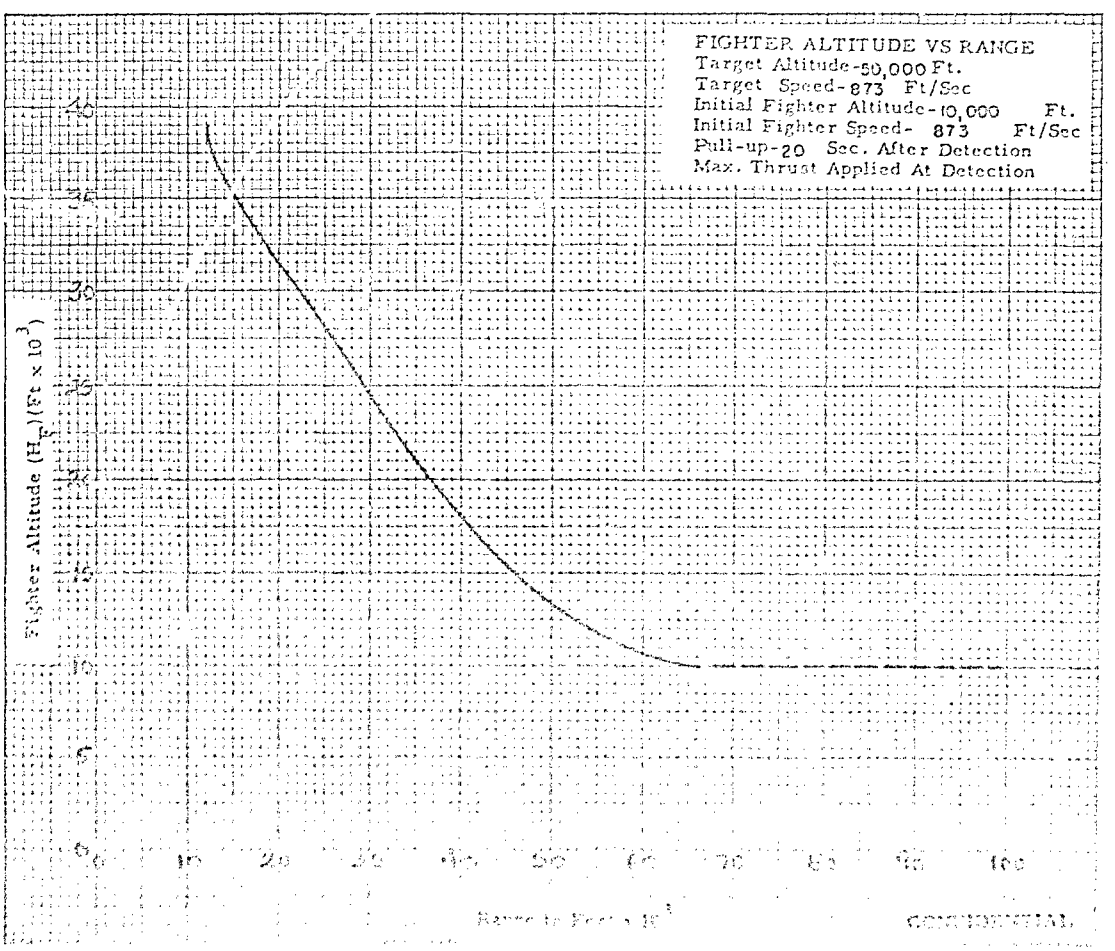


Figure 613





CONFIDENTIAL

Figure 6

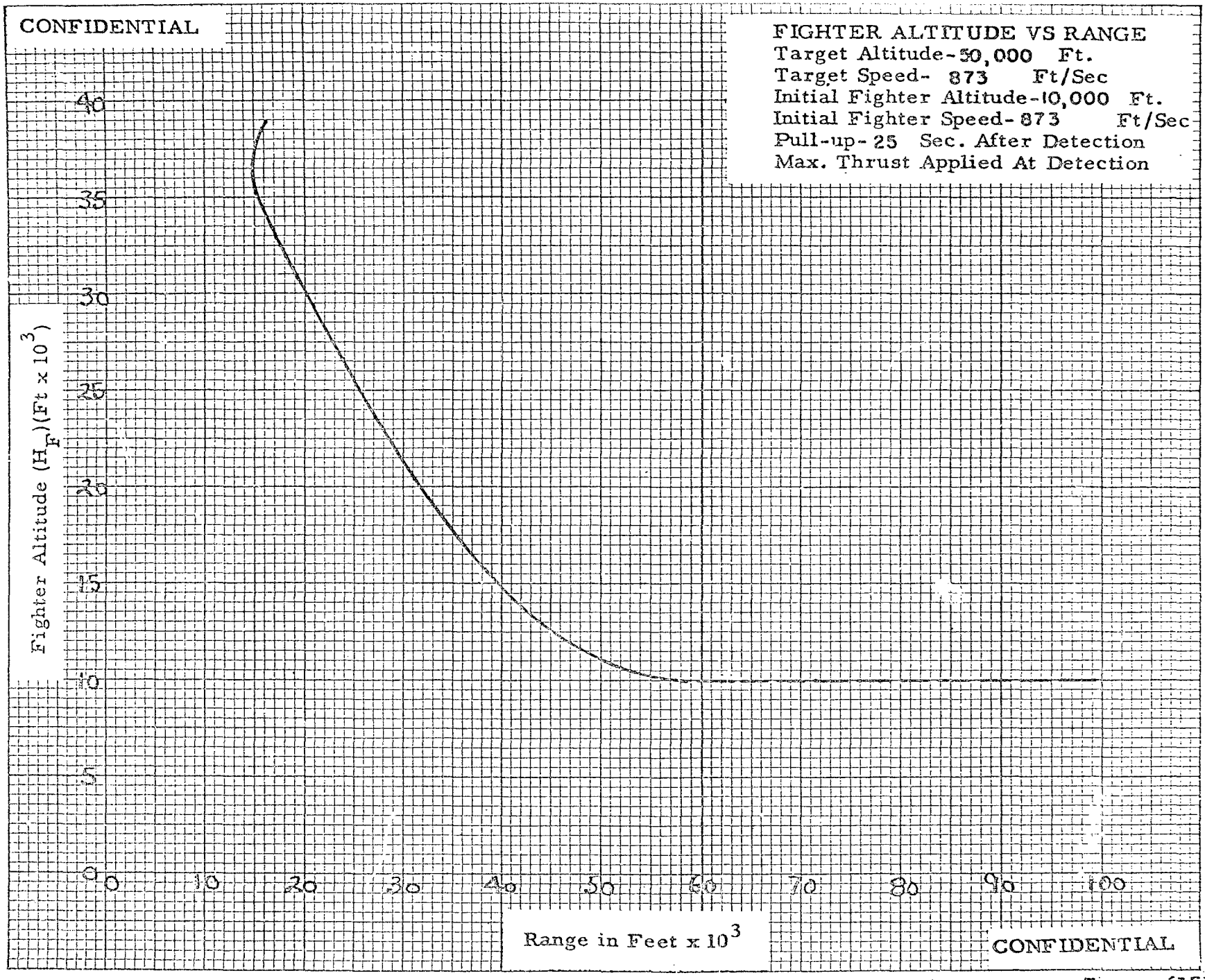
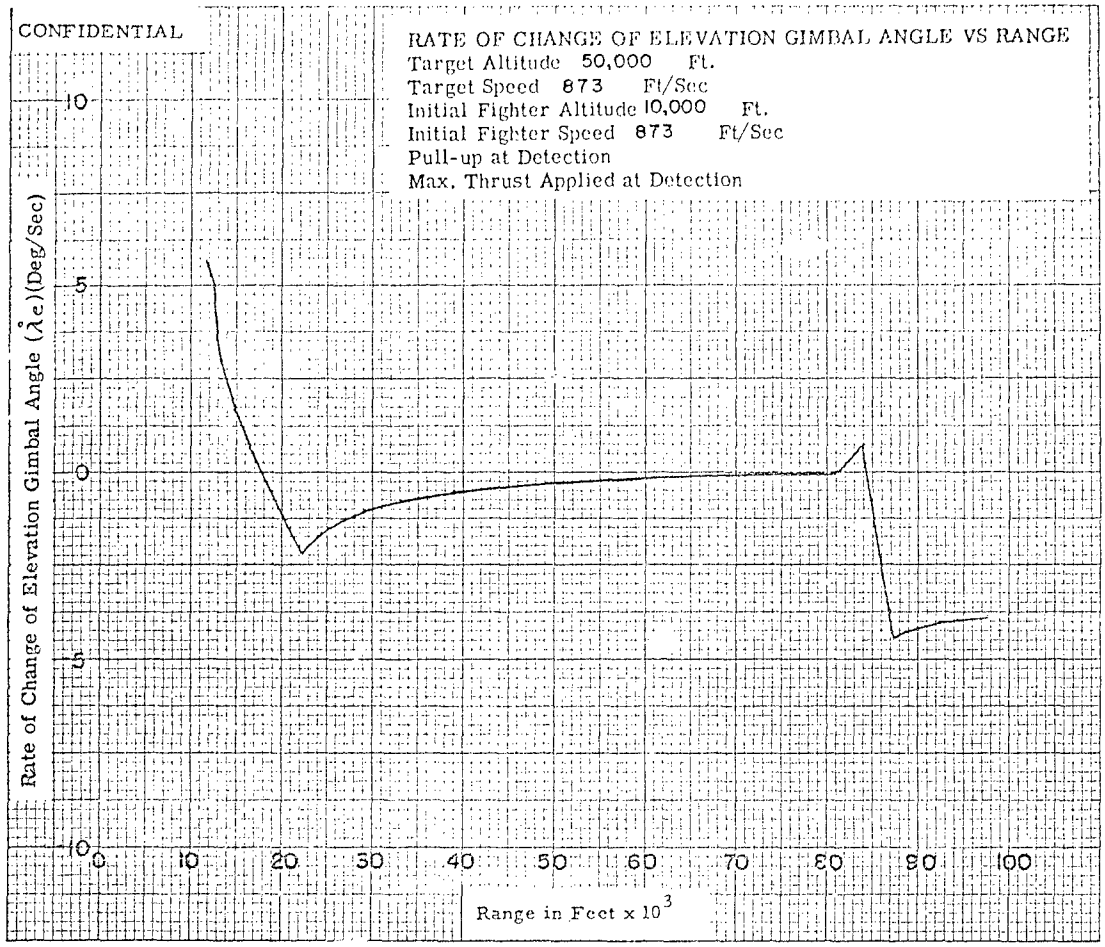

CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed-873 Ft/Sec
Pull-up-25 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 615


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}e$) (Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

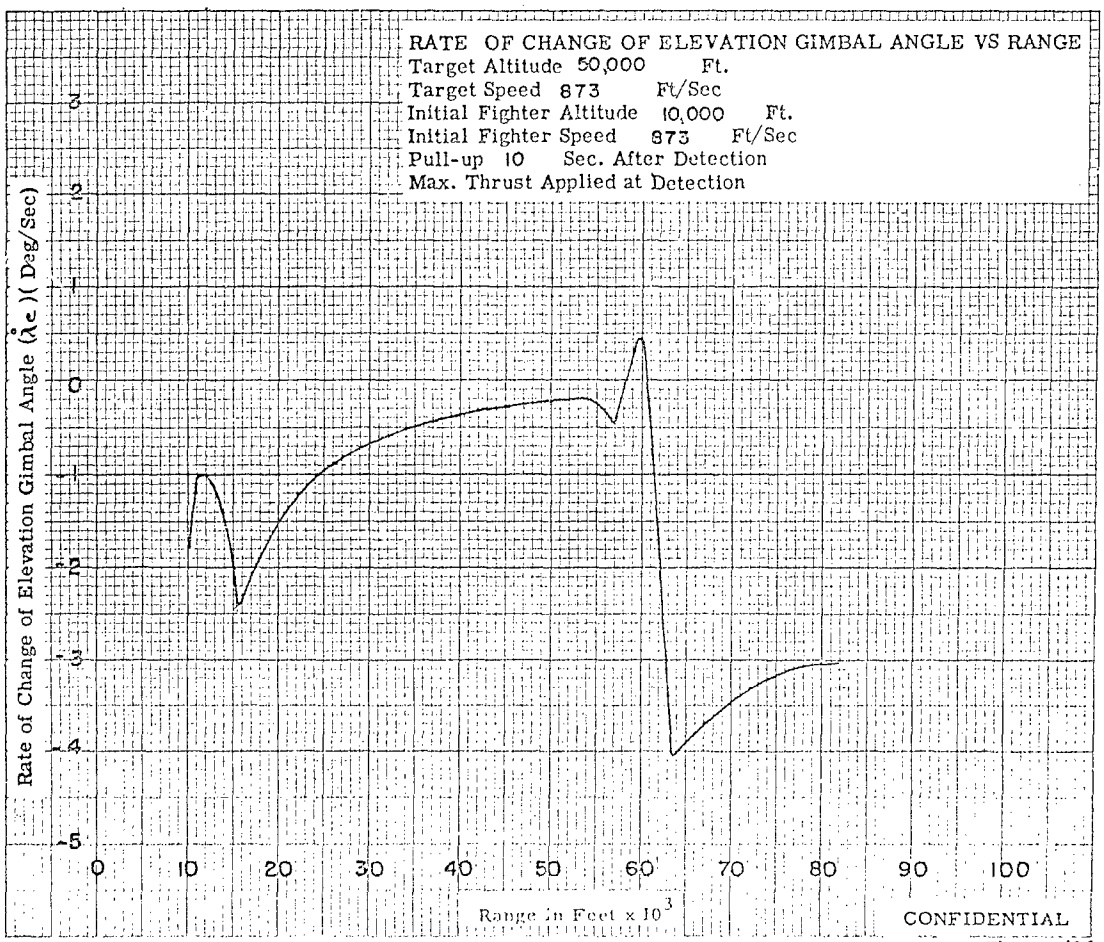
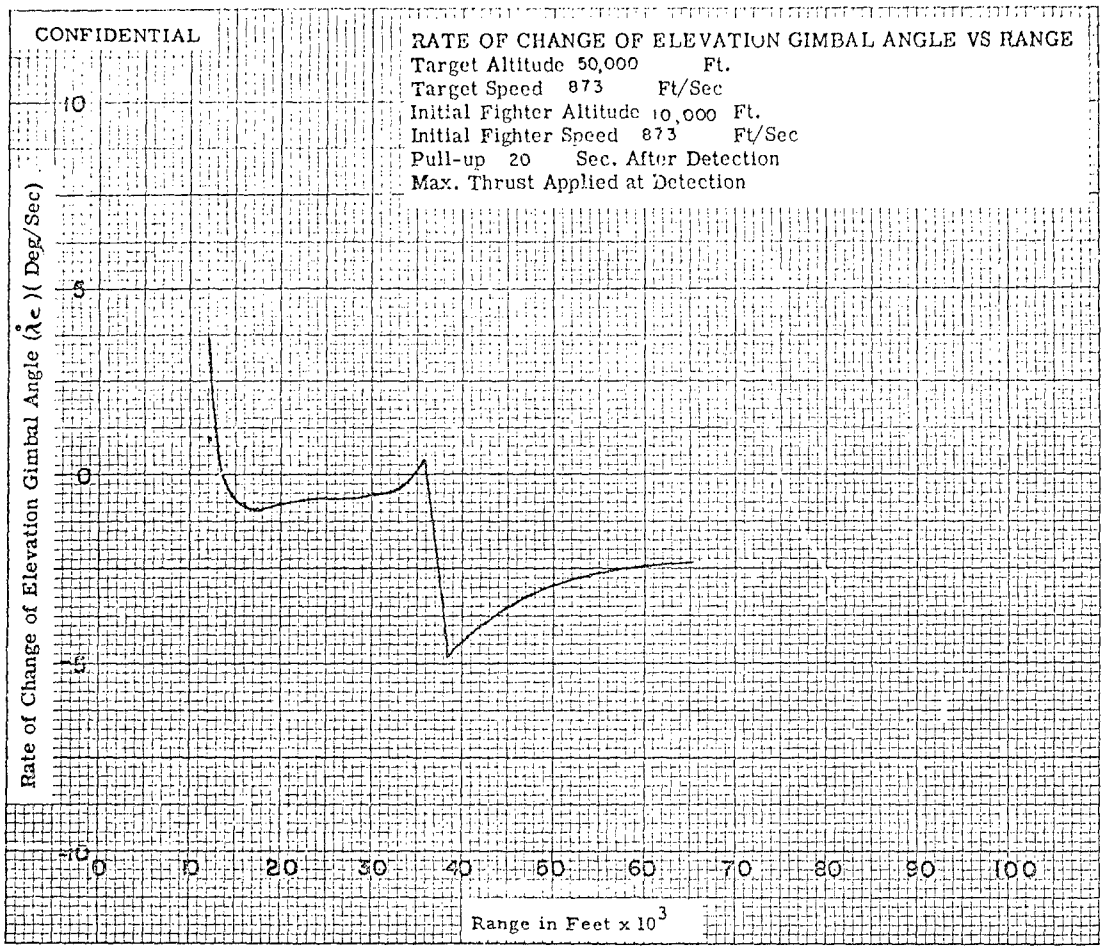
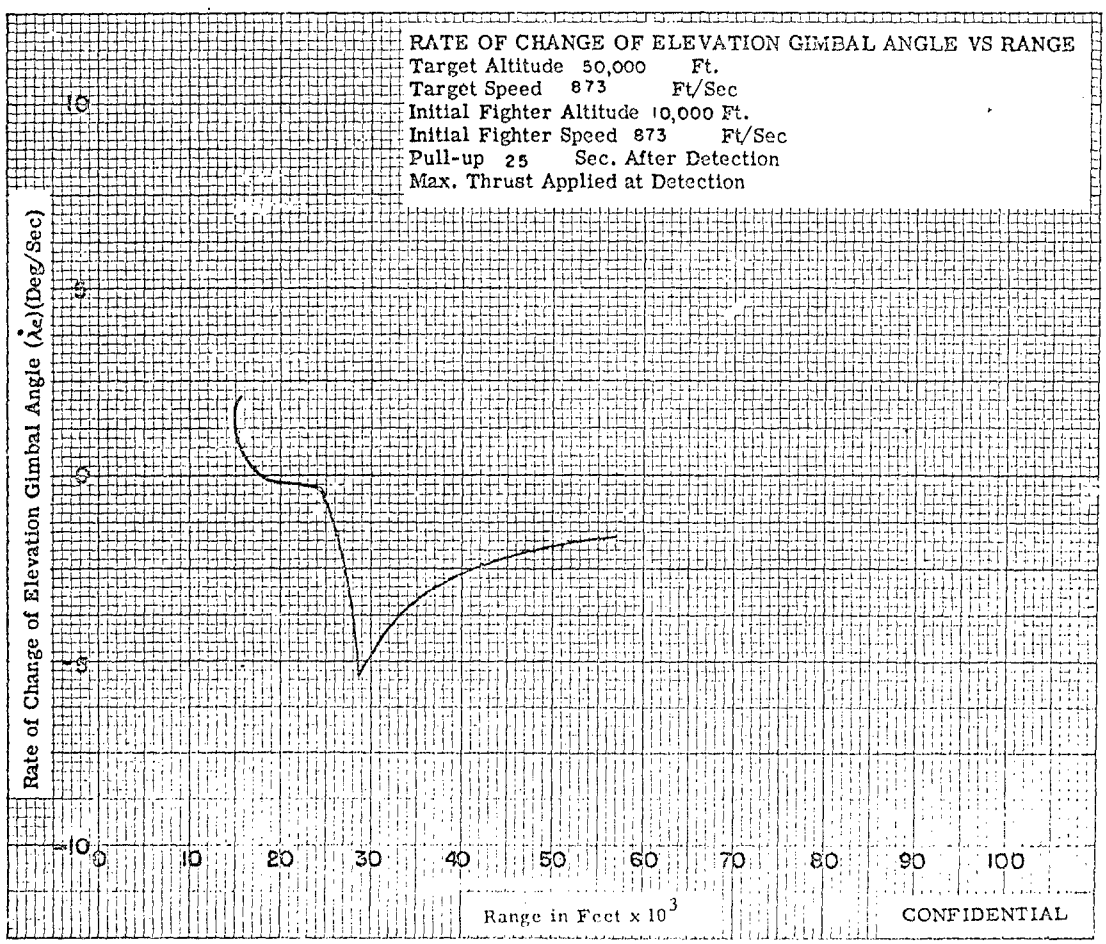

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}e$) (Deg/Sec)
3
2
1
0
-1
-2
-3
-4
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 616

CONFIDENTIAL

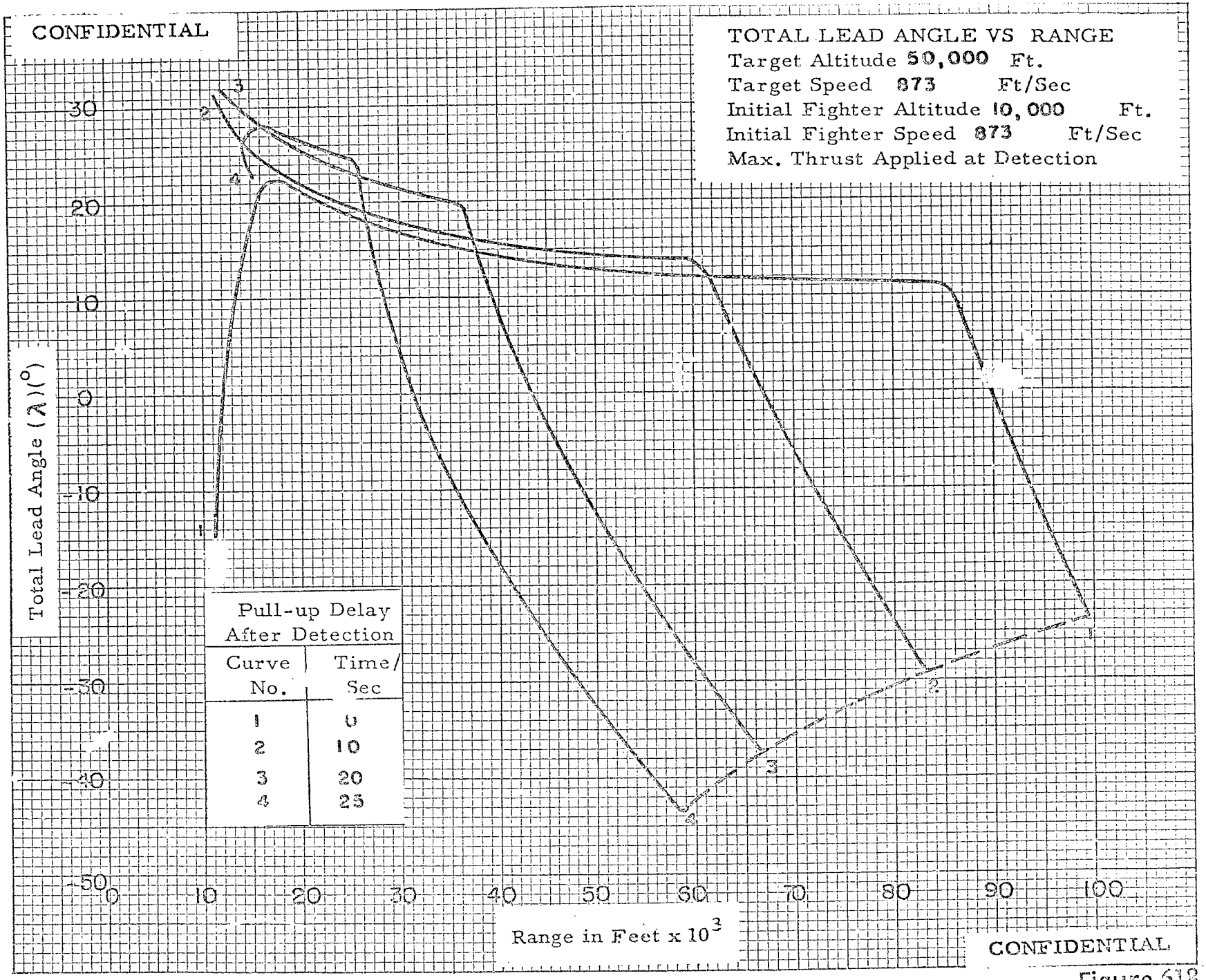




CONFIDENTIAL

Figure 617

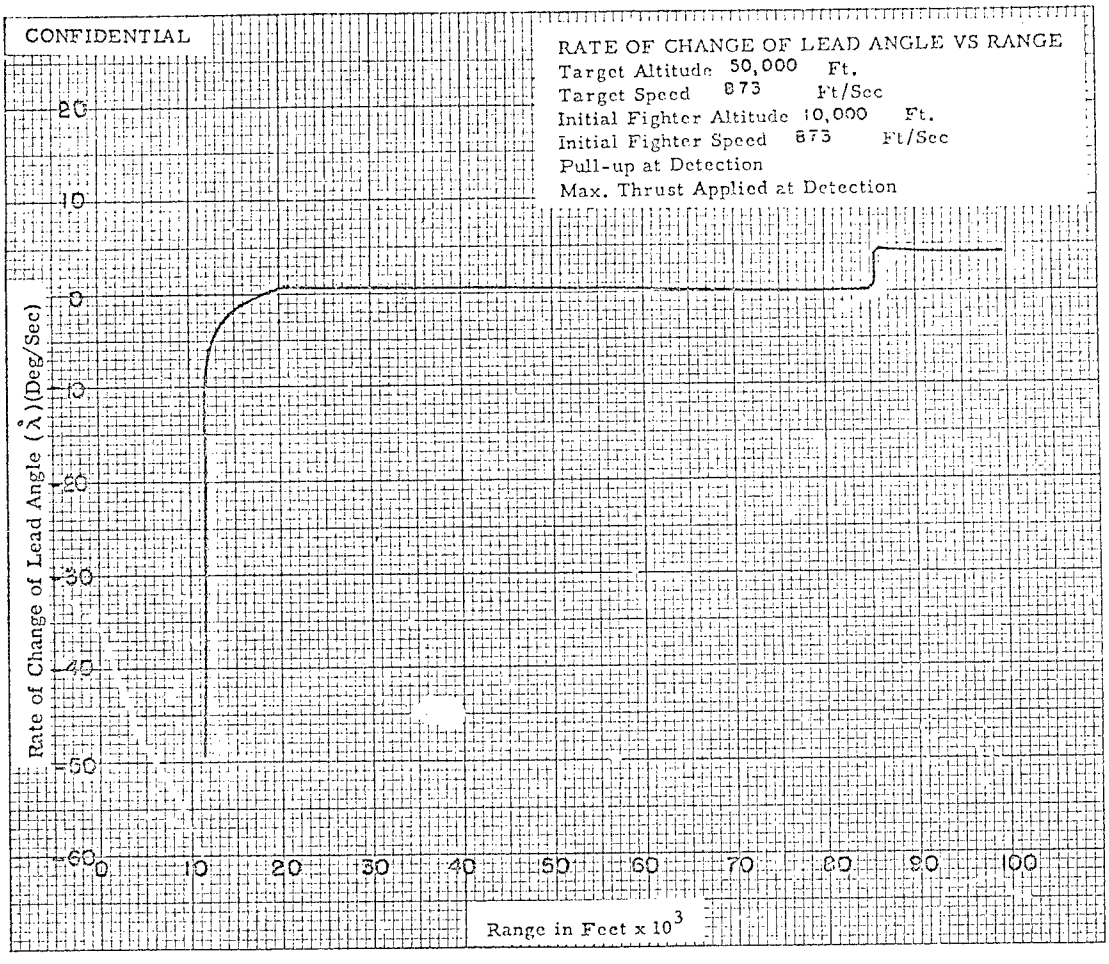
CONFIDENTIAL

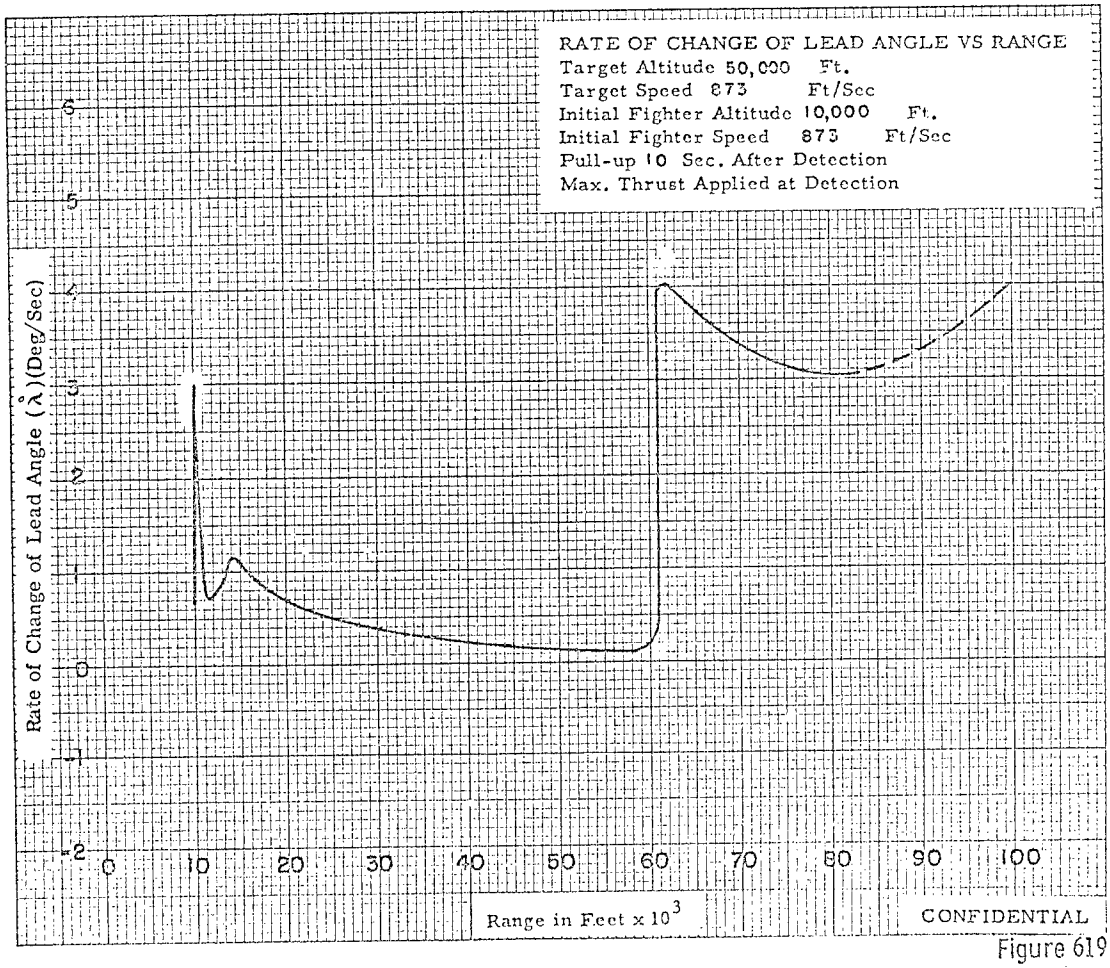


CONFIDENTIAL

Figure 618

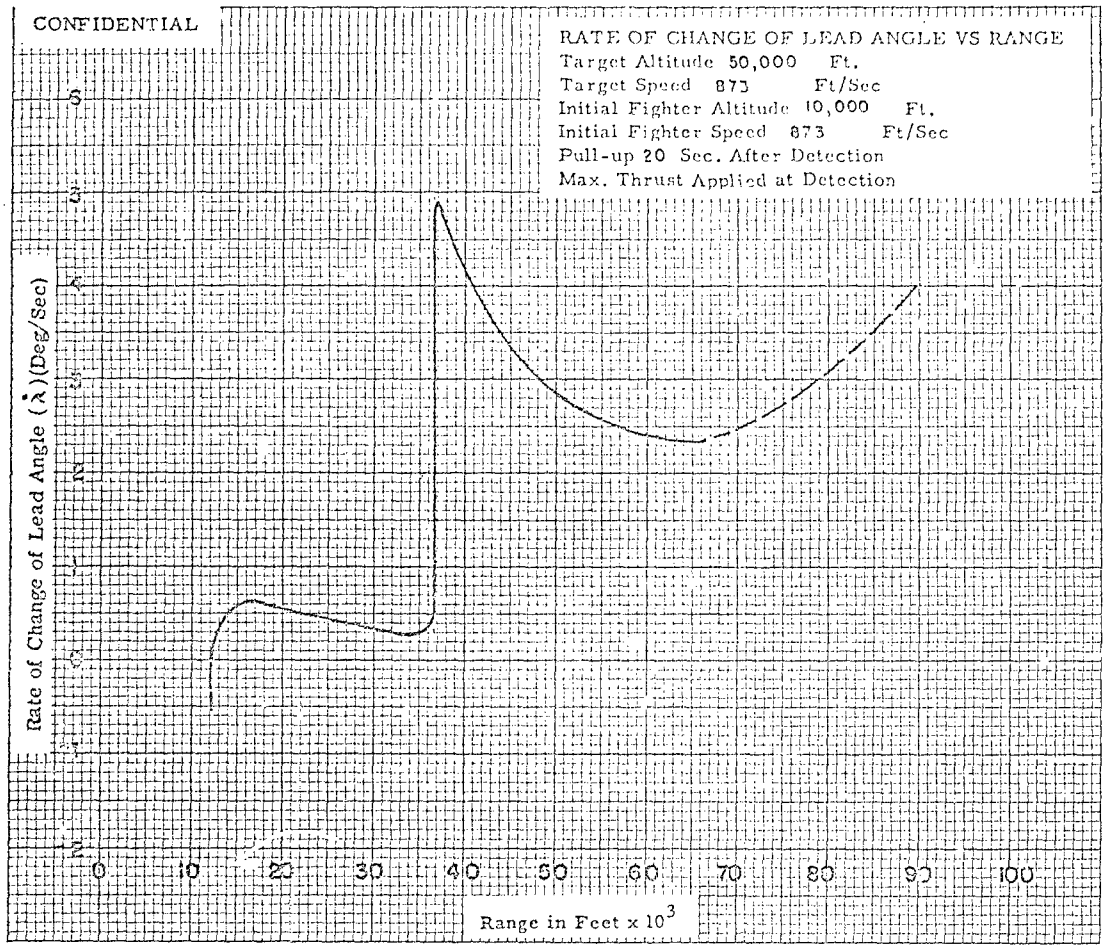
CONFIDENTIAL





CONFIDENTIAL

Figure 619


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

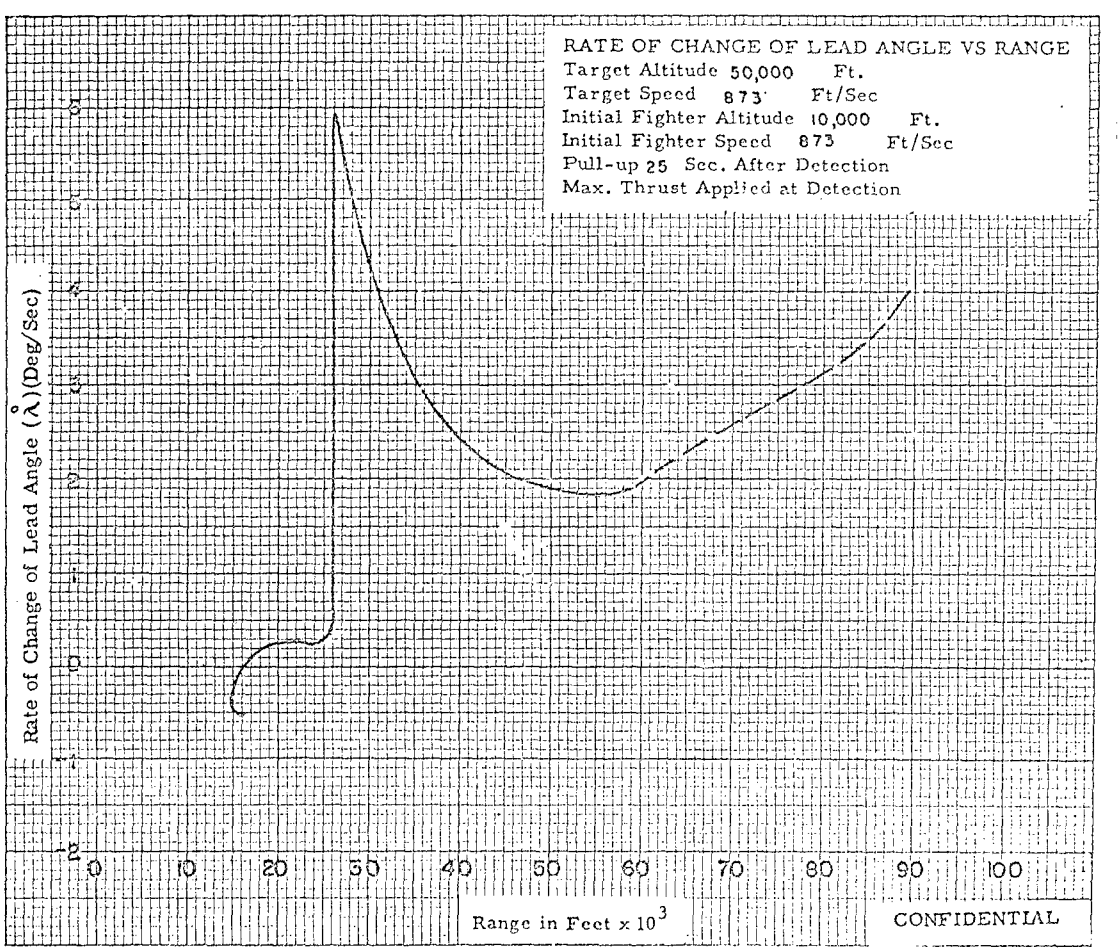
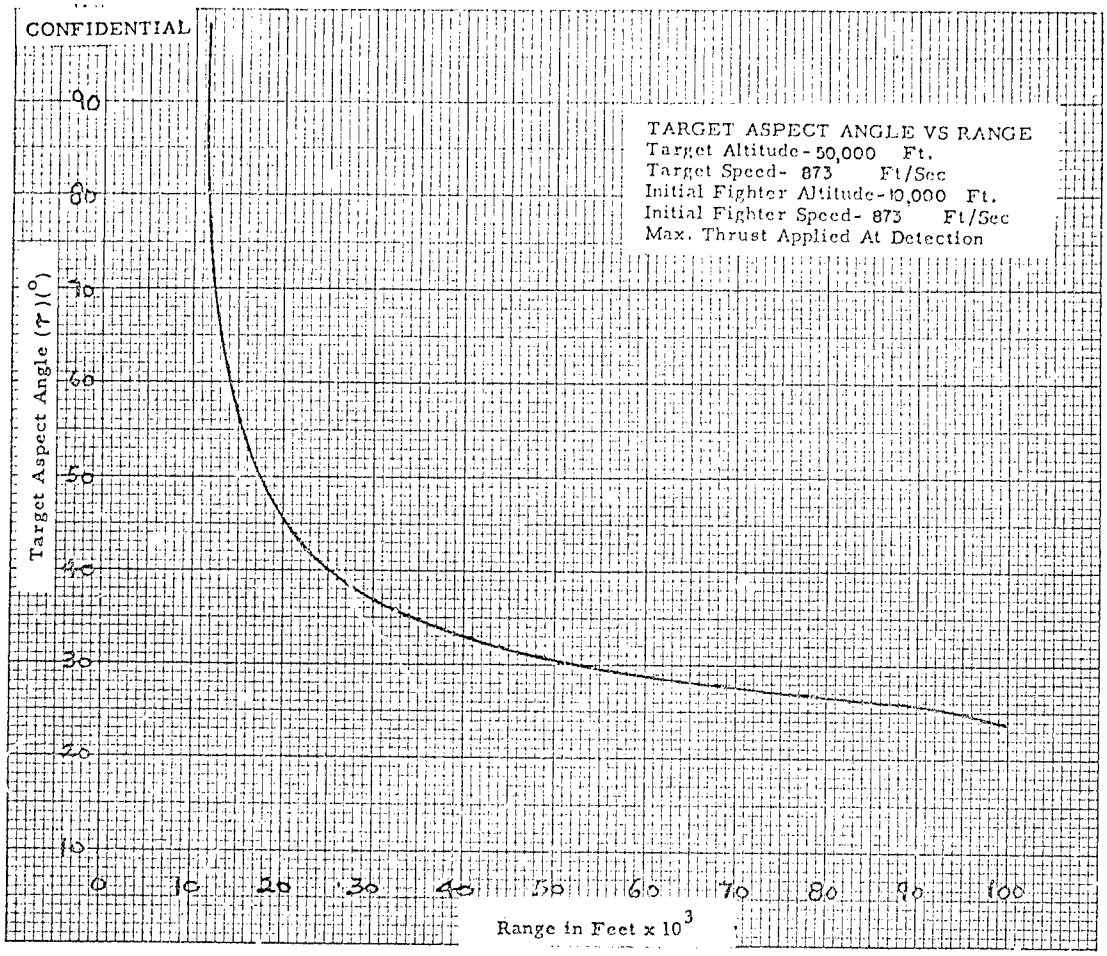

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 873 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle ($\dot{\lambda}$)(Deg/Sec)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 620


TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Max. Thrust Applied At Detection
Target Aspect Angle (T)(°)
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

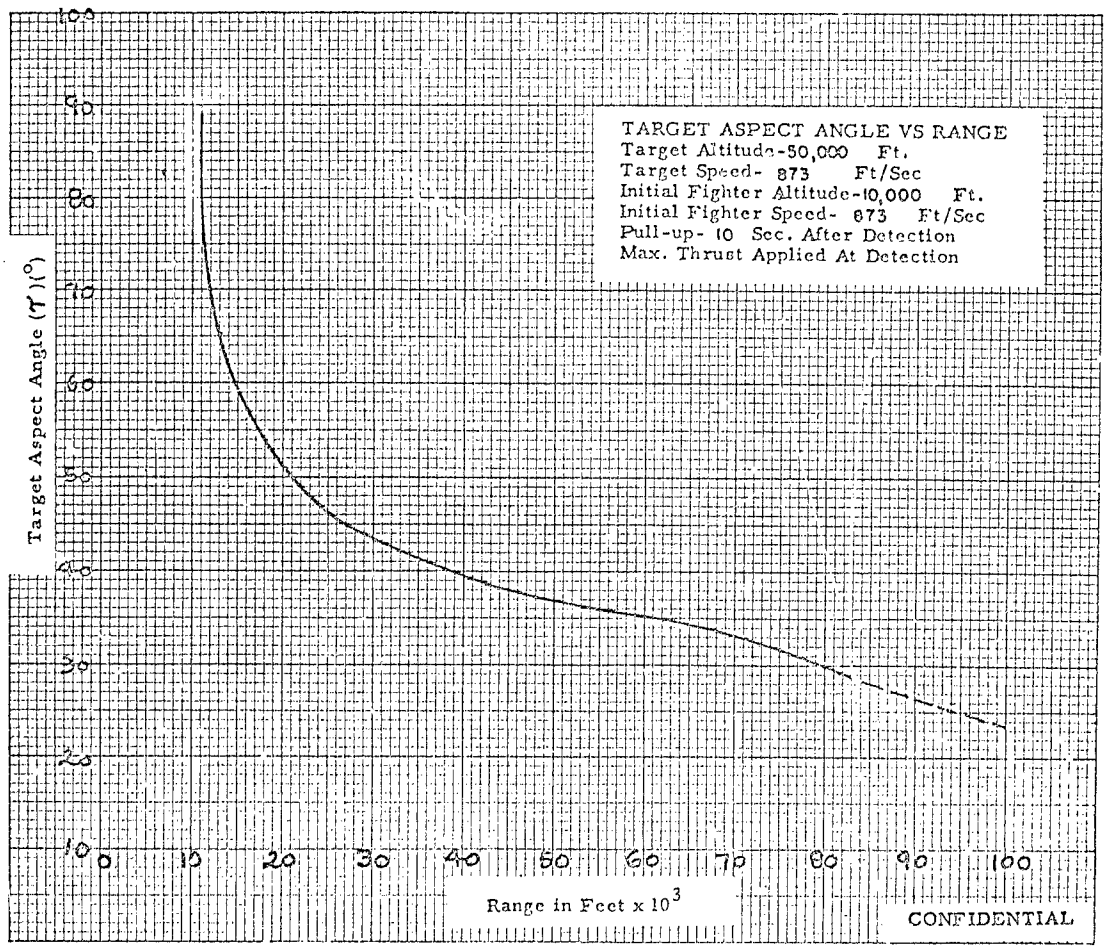
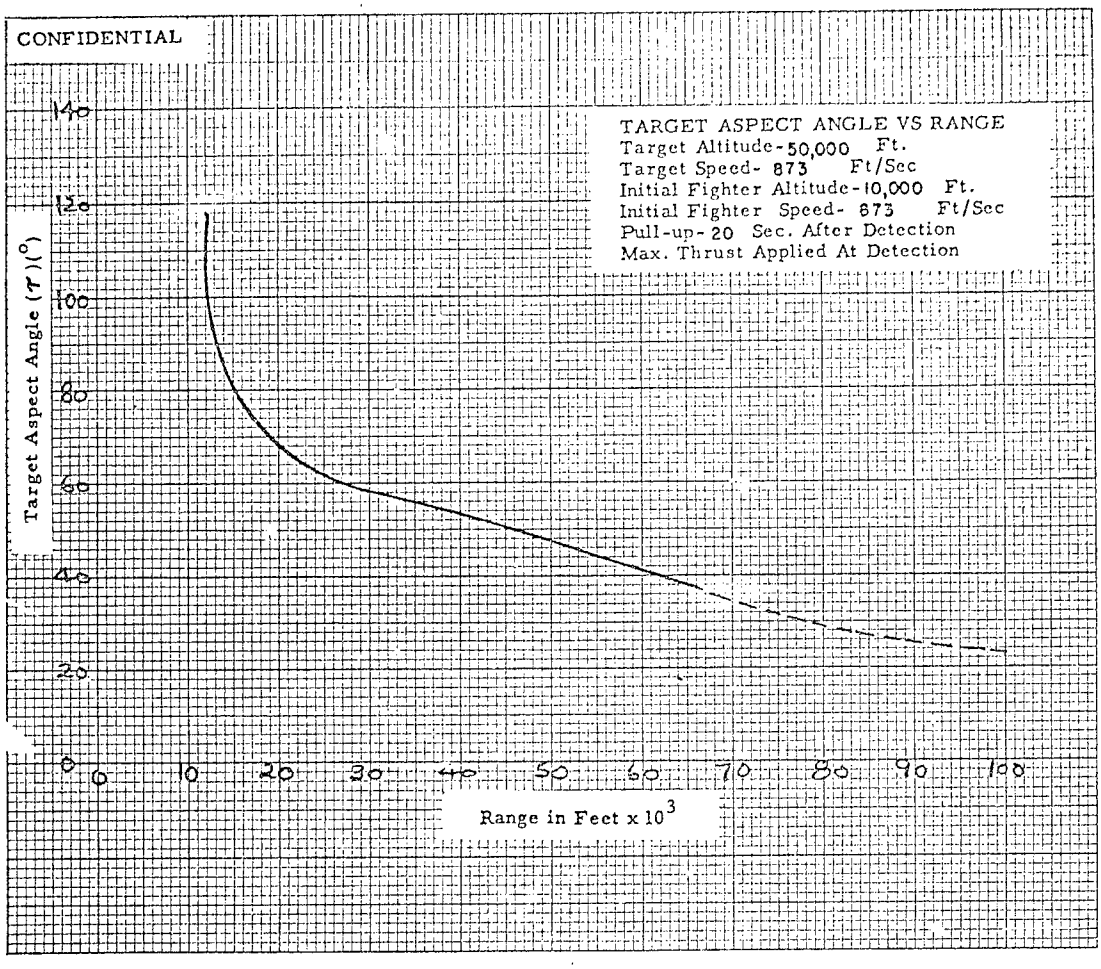
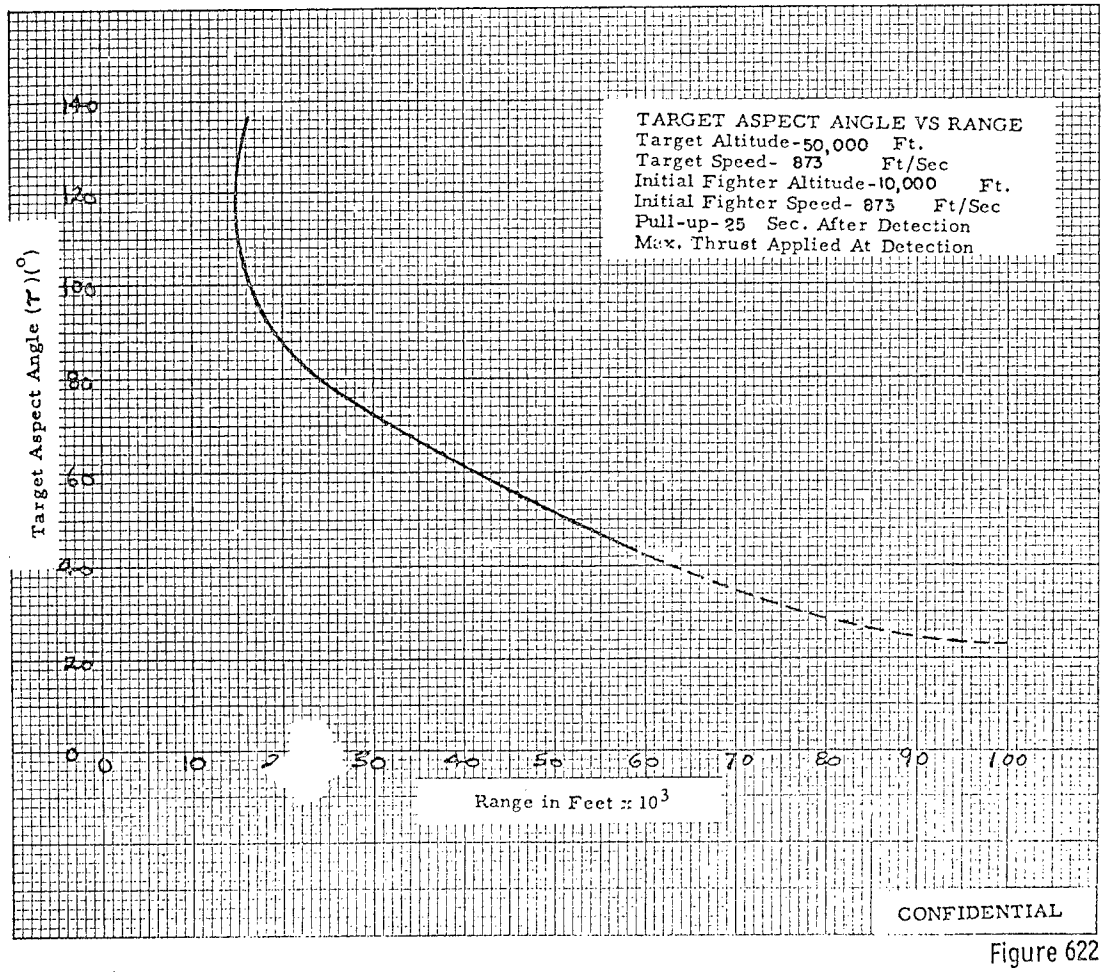

TARGET ASPECT ANGLE VS RANGE
Target Altitude-50,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 873 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (T)(°)
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 621

CONFIDENTIAL

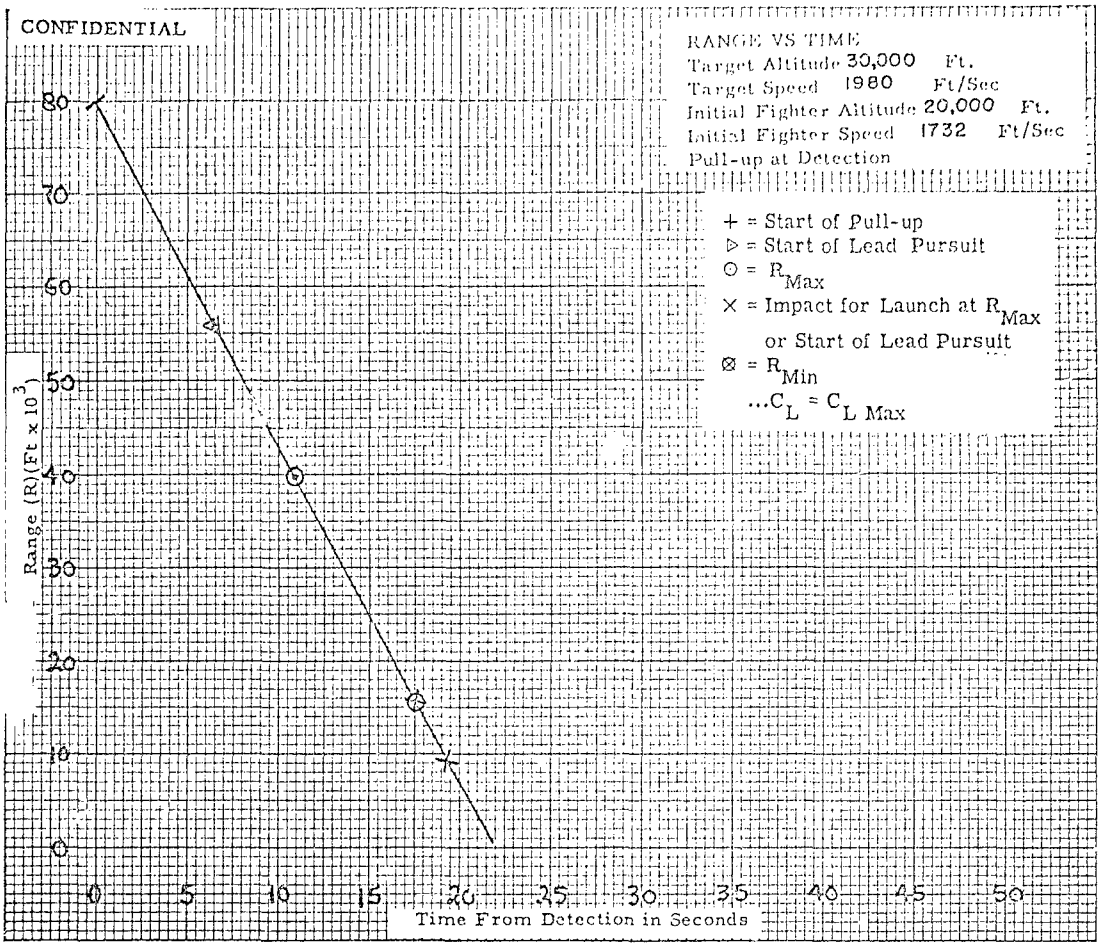


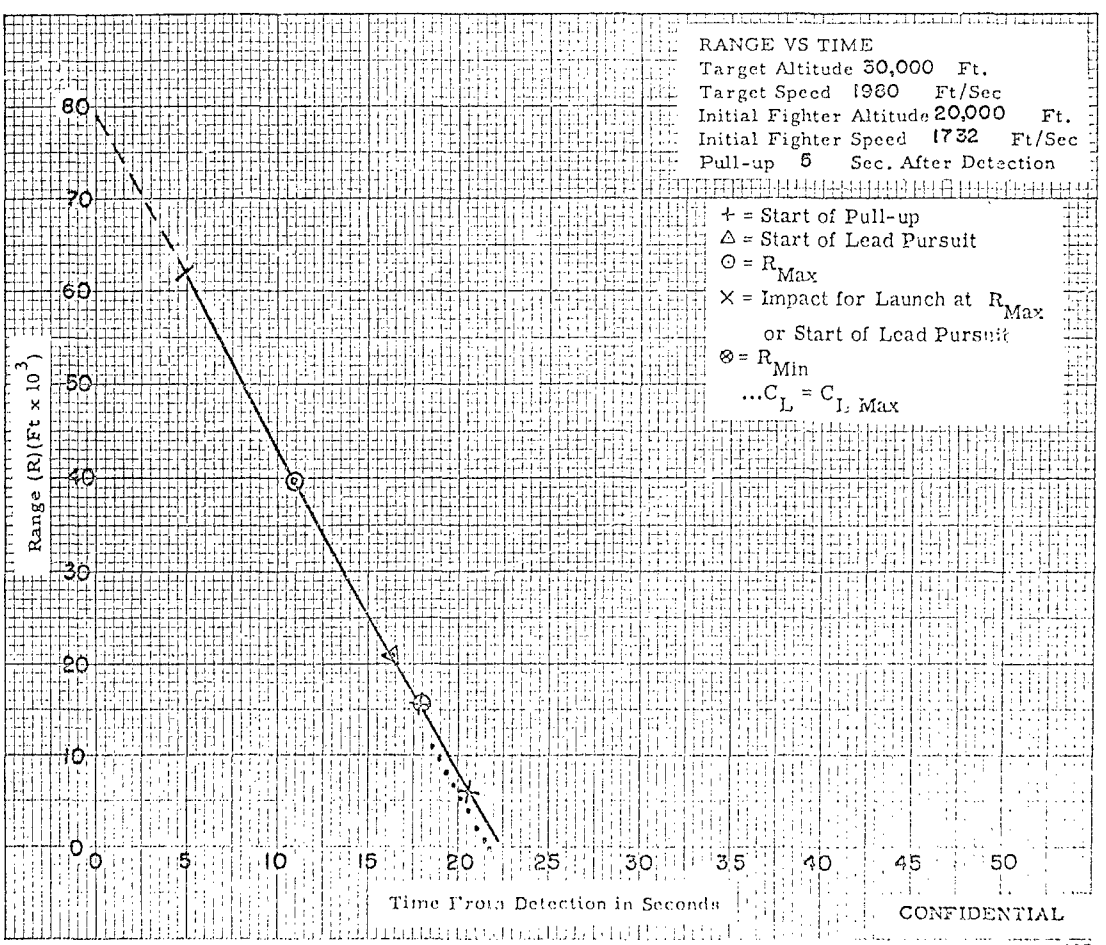


CONFIDENTIAL

Figure 622

CONFIDENTIAL

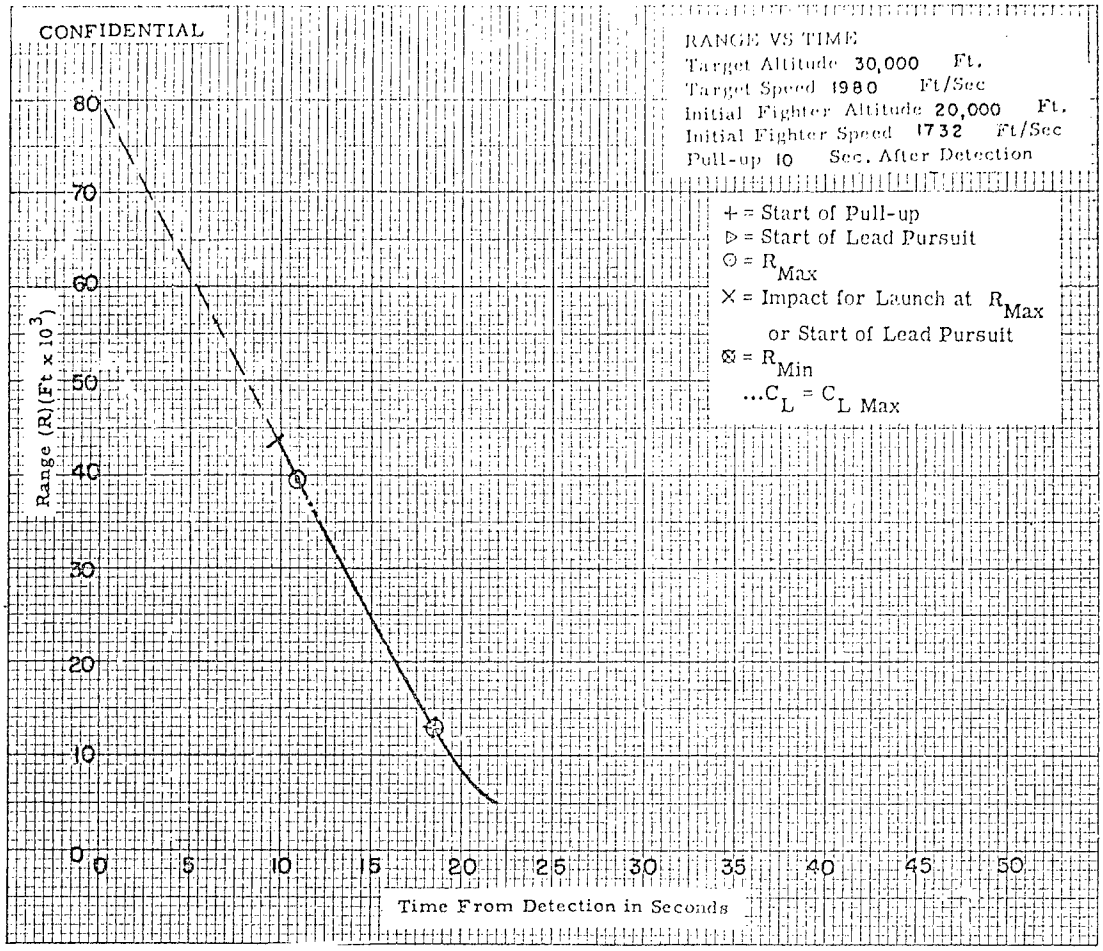


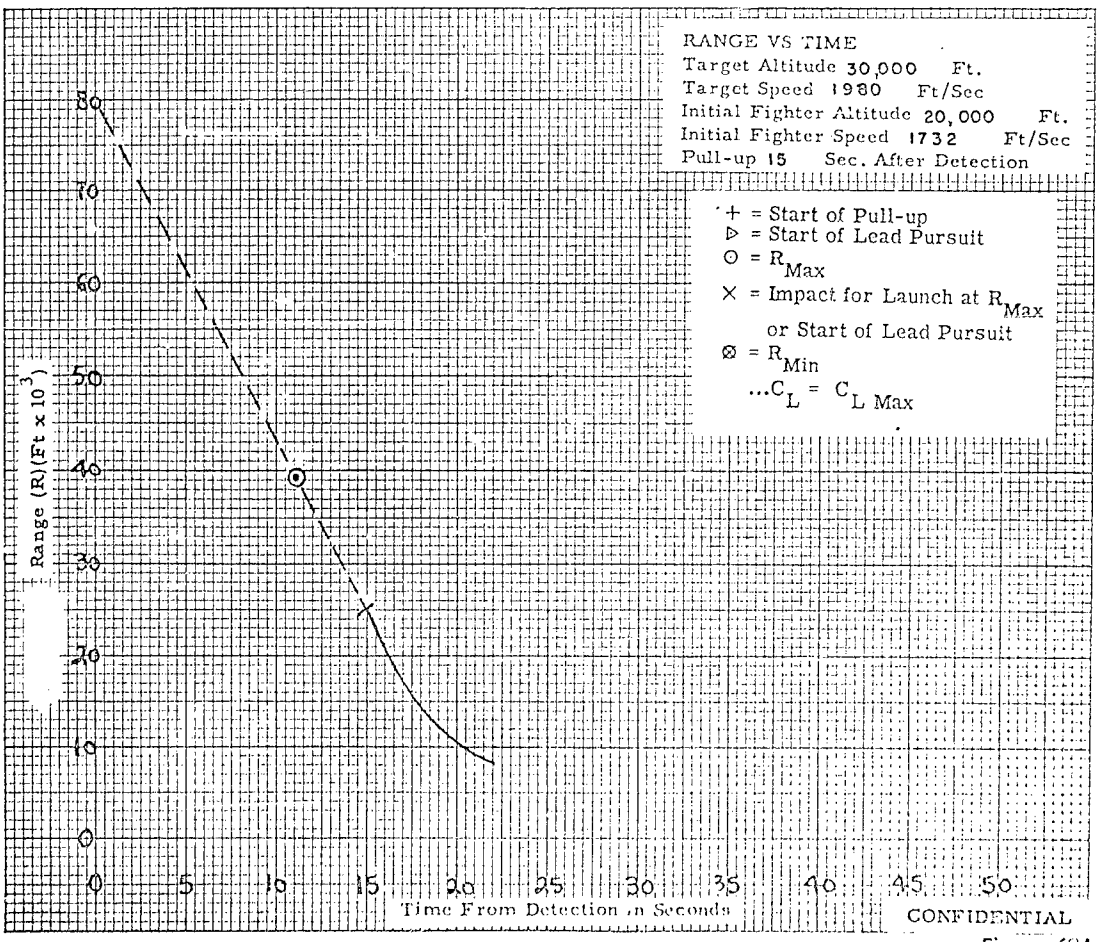


CONFIDENTIAL

Figure 623

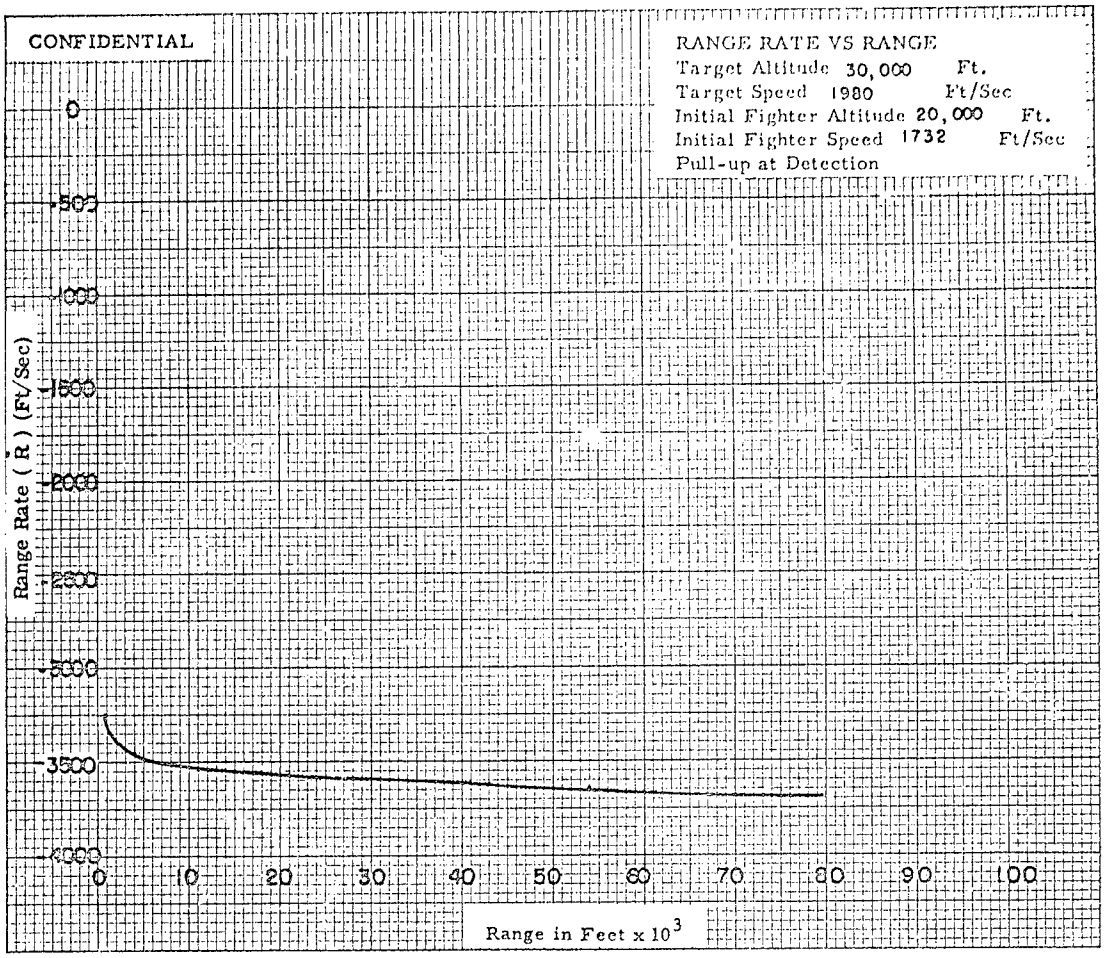
CONFIDENTIAL





CONFIDENTIAL

Figure 624


RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ) (Ft/Sec)
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
-4000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

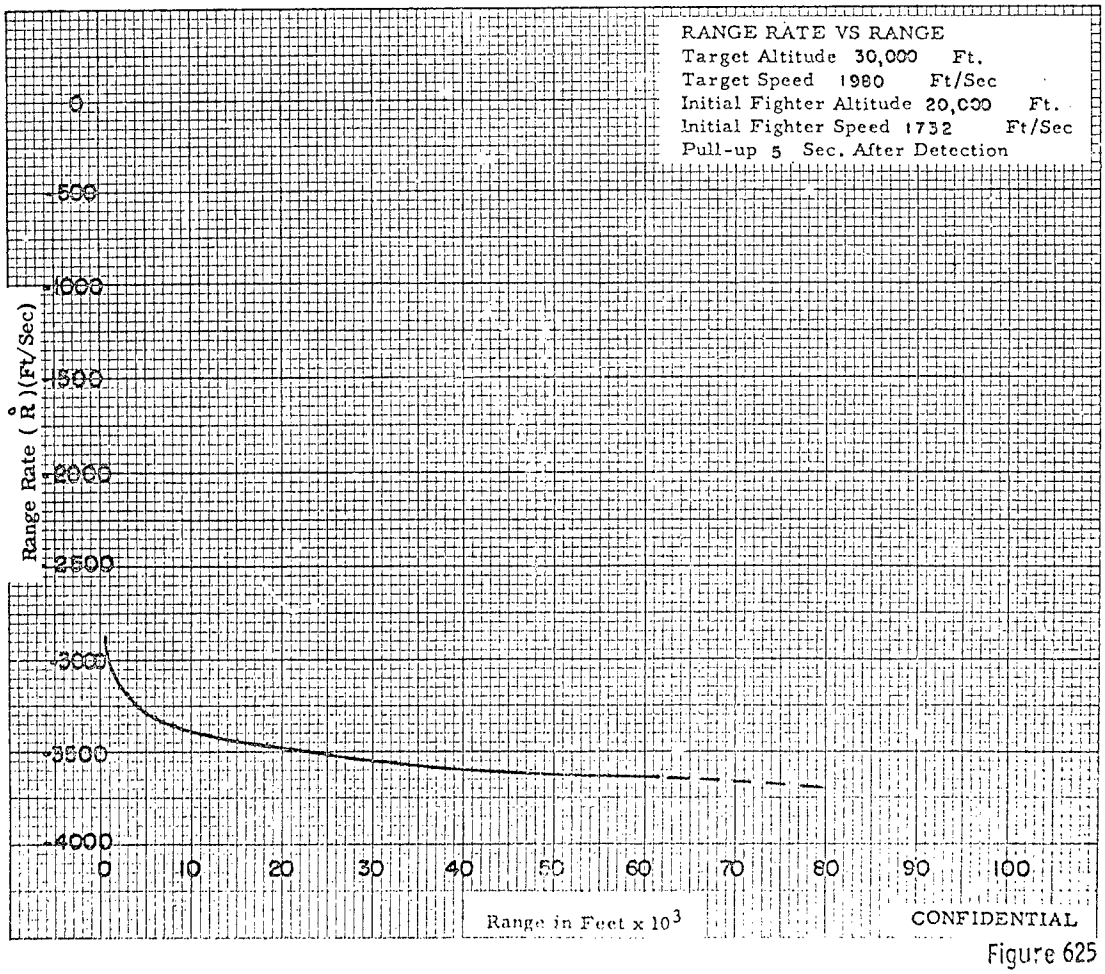
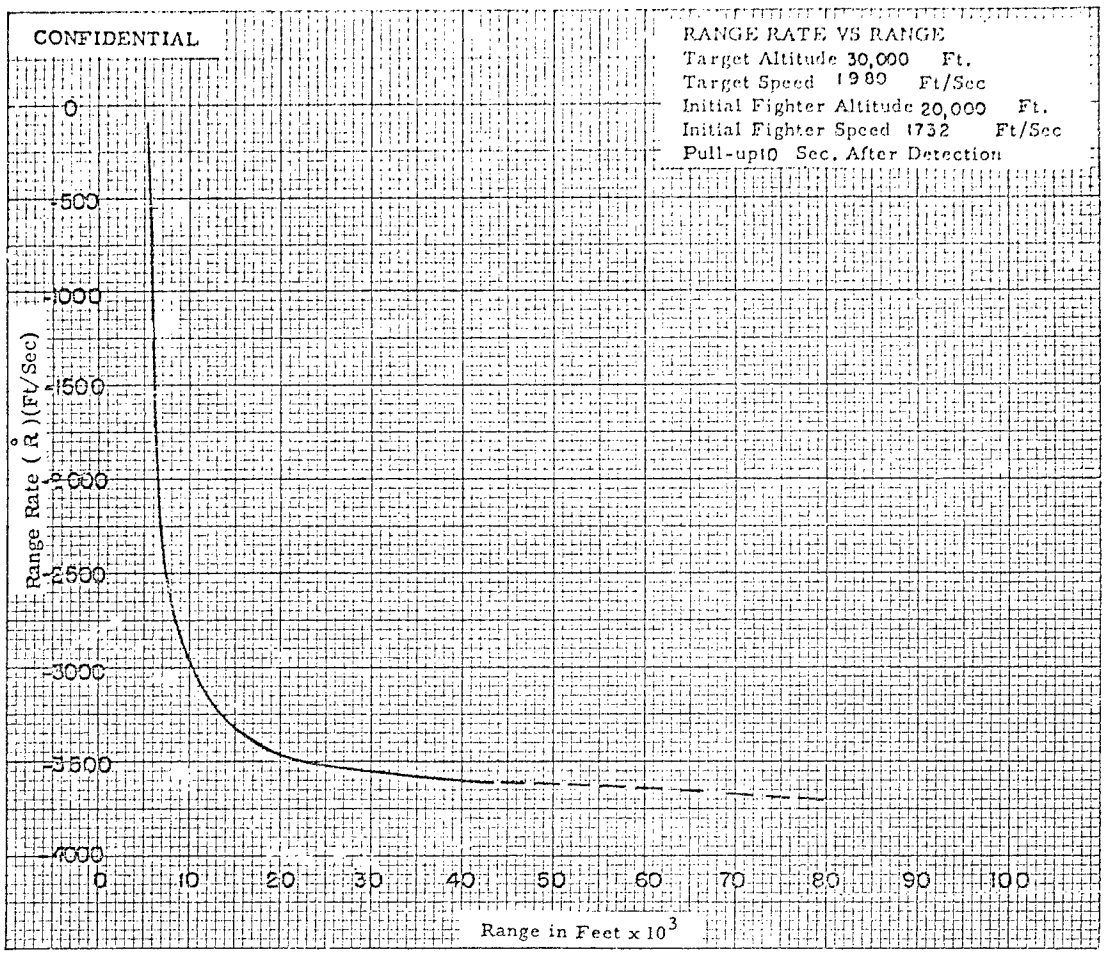

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 5 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
-4000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 625


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up10 Sec. After Detection
Range Rate ($\dot{R}$)(Ft/Sec)
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
-4000
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

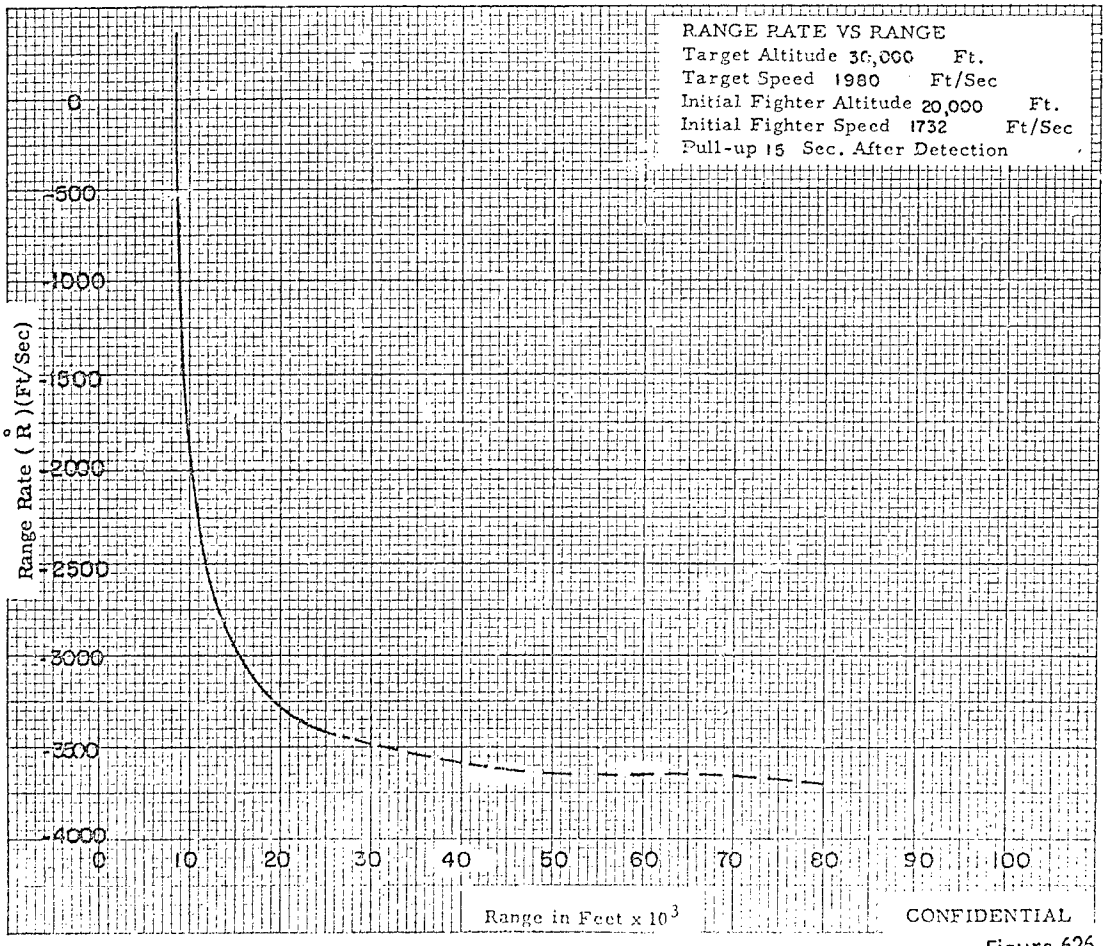
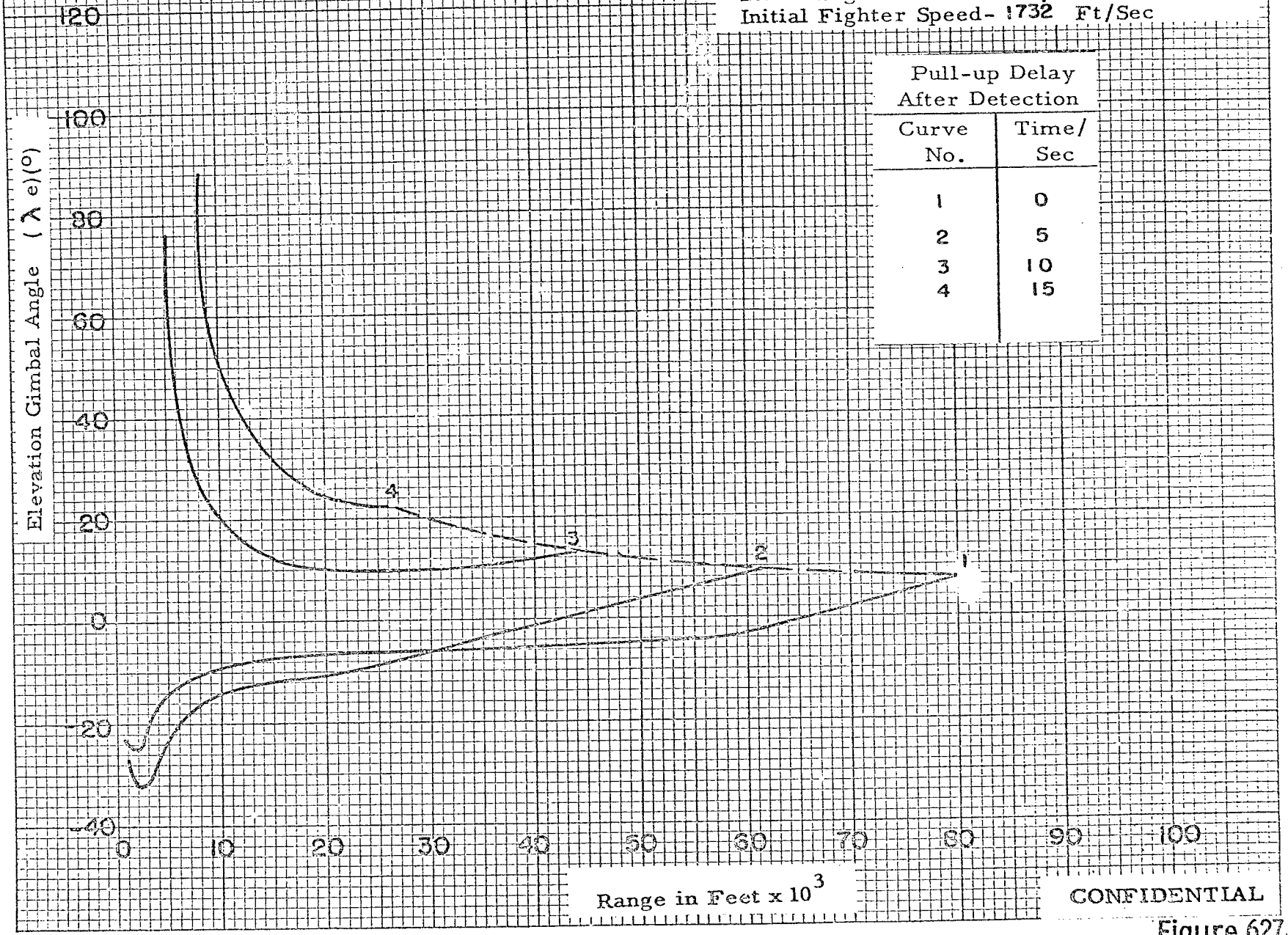

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Range Rate ($\dot{R}$)(Ft/Sec)
0
-500
-1000
-1500
-2000
-2500
-3000
-3500
-4000
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 626

CONFIDENTIAL

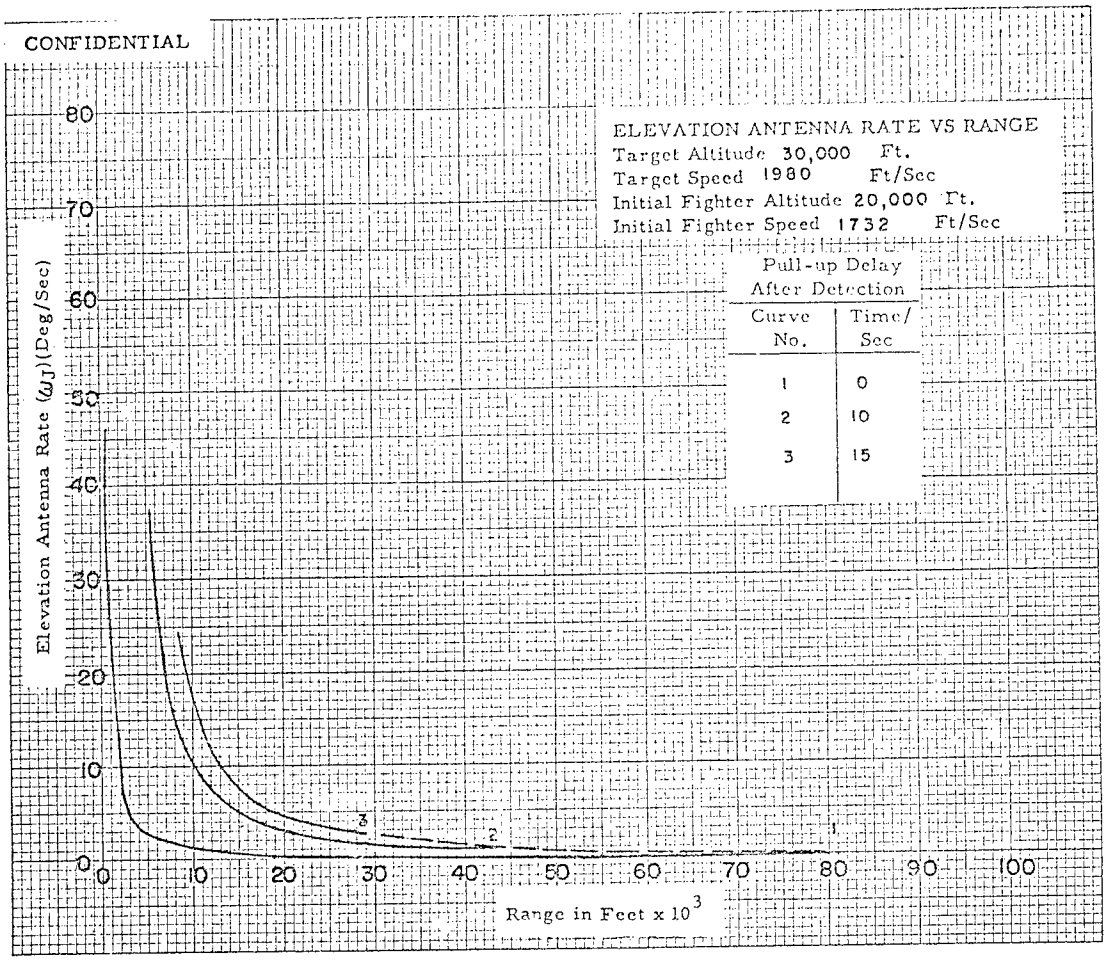
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed- 1980 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1732 Ft/Sec

Pull-up Delay After Detection	
Curve No.	Time/ Sec
1	0
2	5
3	10
4	15



CONFIDENTIAL

Figure 627


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
3 | 15
Elevation Antenna Rate (ωJ)(Deg/Sec)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90 100
0 10 20 30 40 50 60 70 80

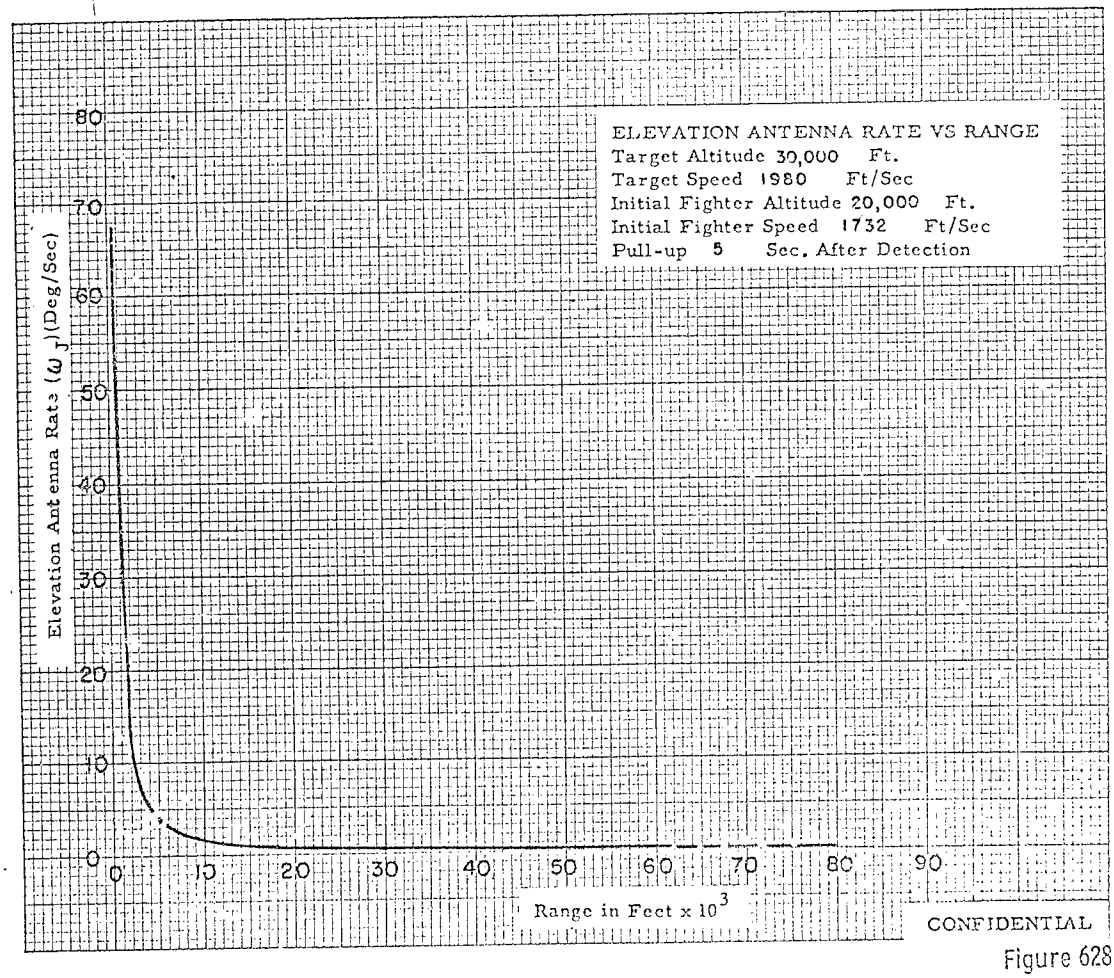
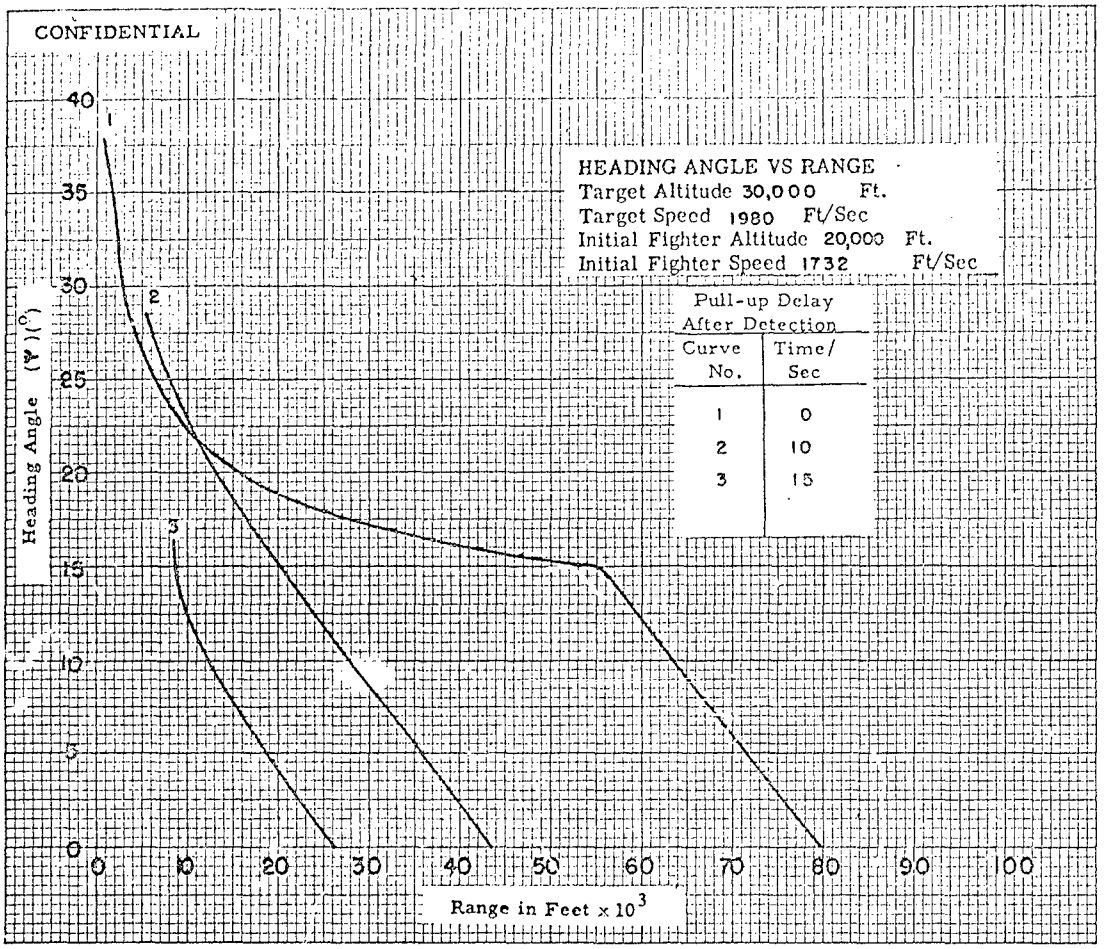

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 5 Sec. After Detection
Elevation Antenna Rate (ωJ)(Deg/Sec)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90
0 10 20 30 40 50 60 70 80

Figure 628


HEADING ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 15
Heading Angle (Ψ)(°)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90 100
0 5 10 15 20 25 30 35 40
1
2
3

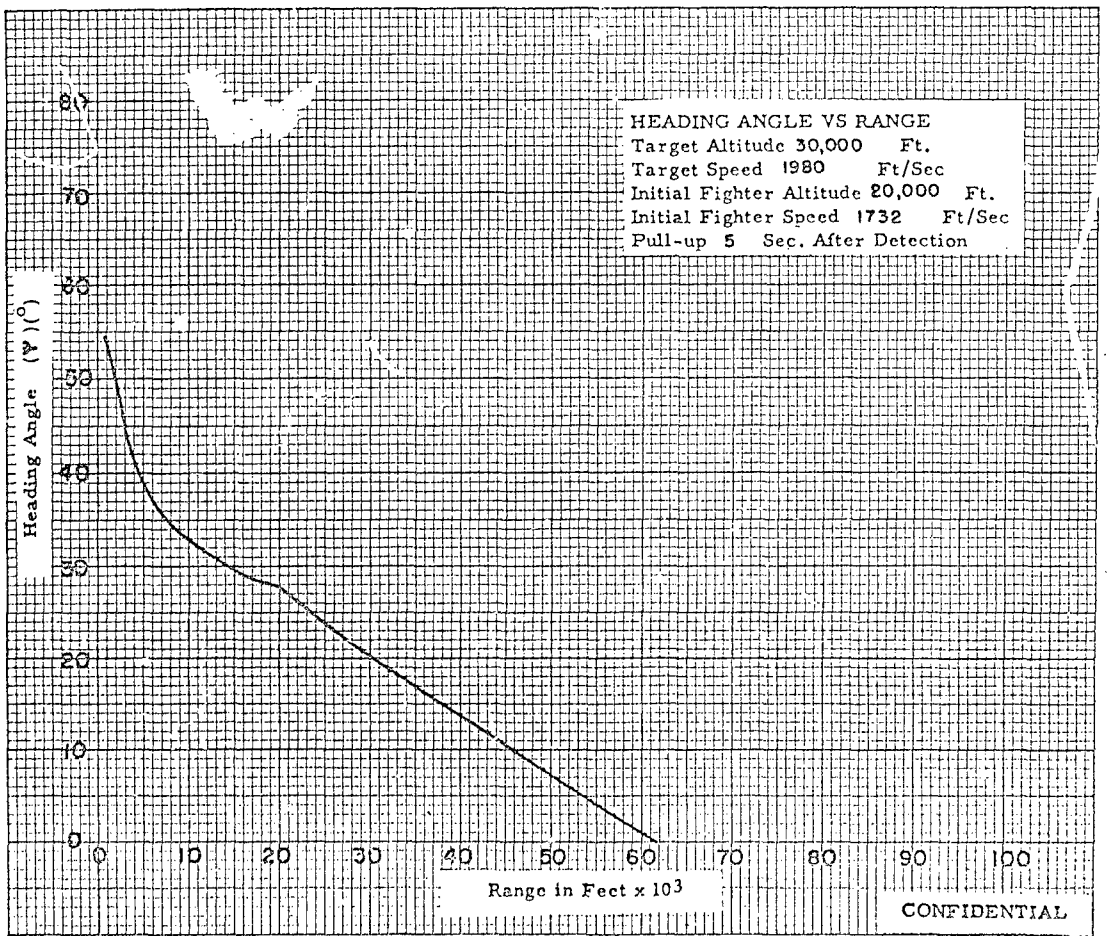
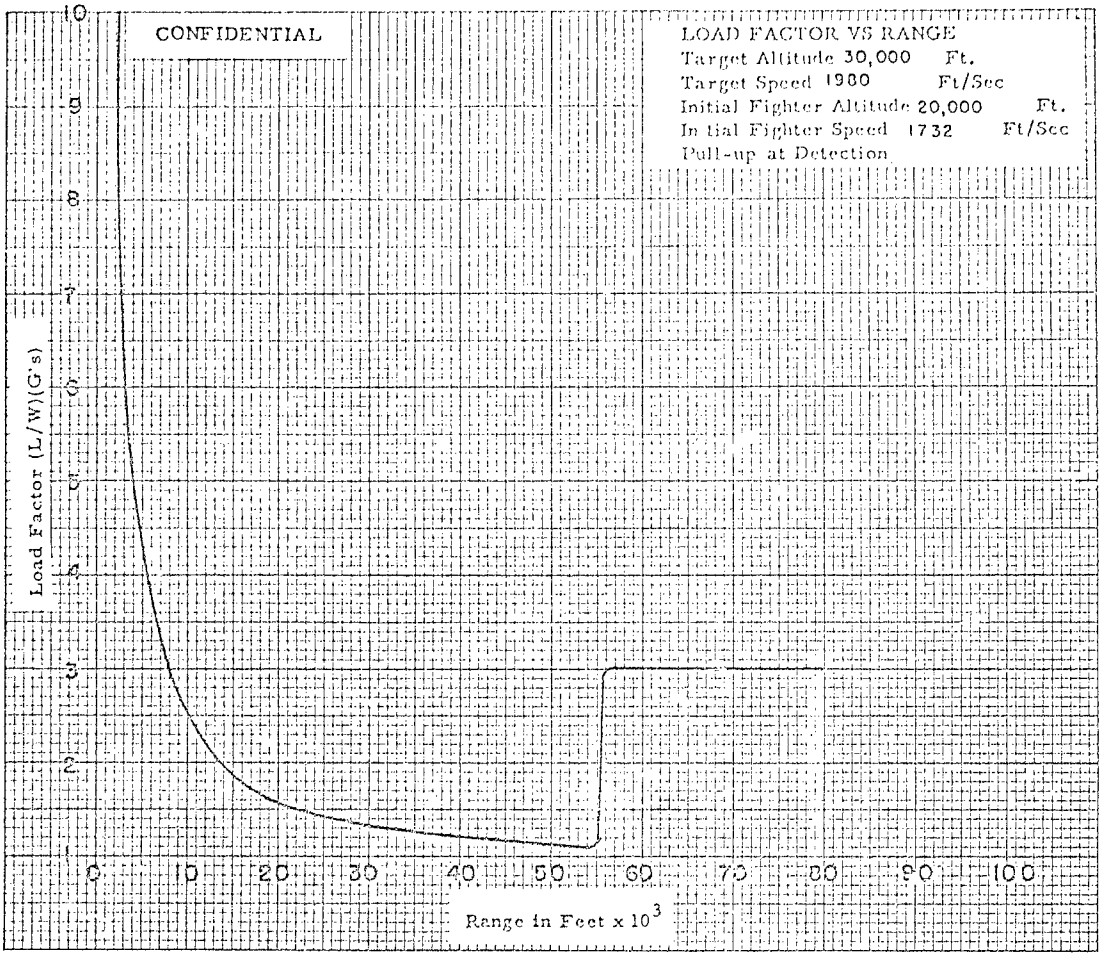

HEADING ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 5 Sec. After Detection
Heading Angle (Ψ)(°)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90 100
0 10 20 30 40 50 60 70 80
CONFIDENTIAL

Figure 629


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

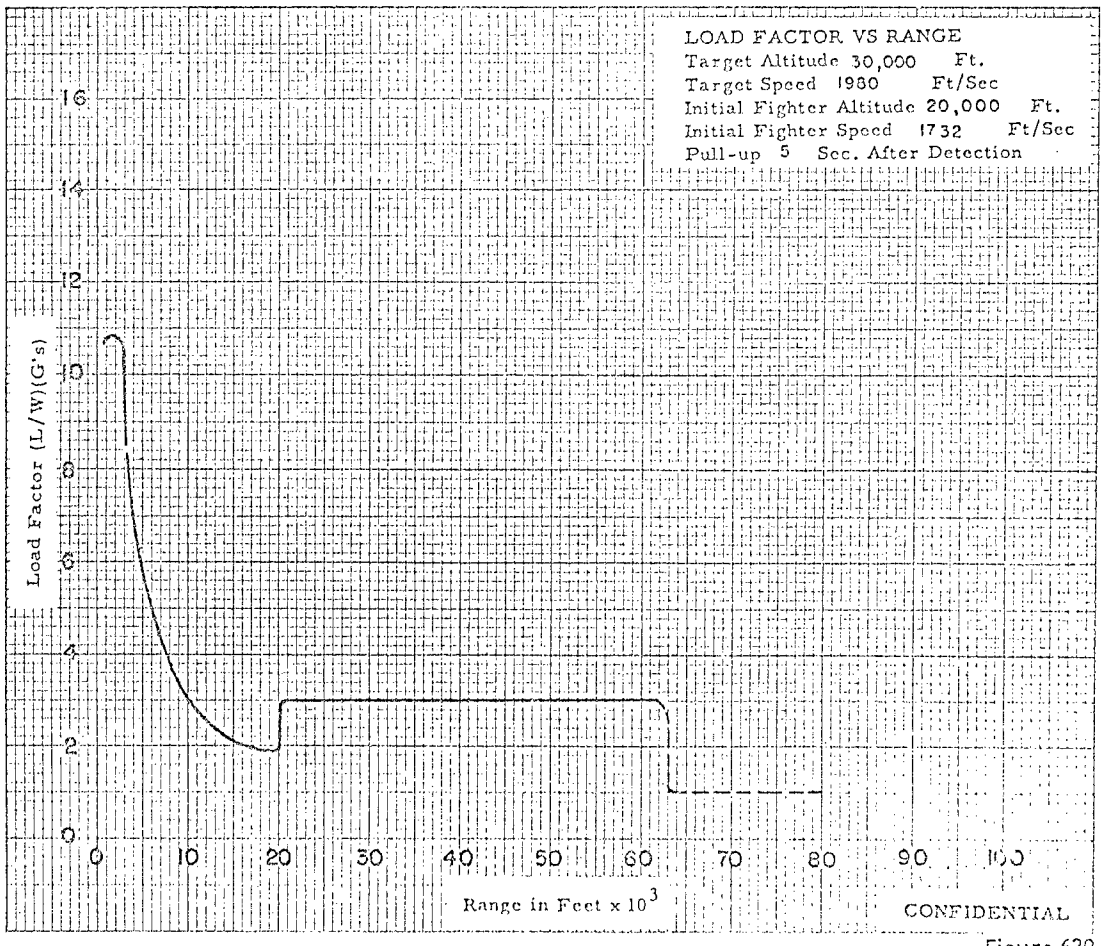
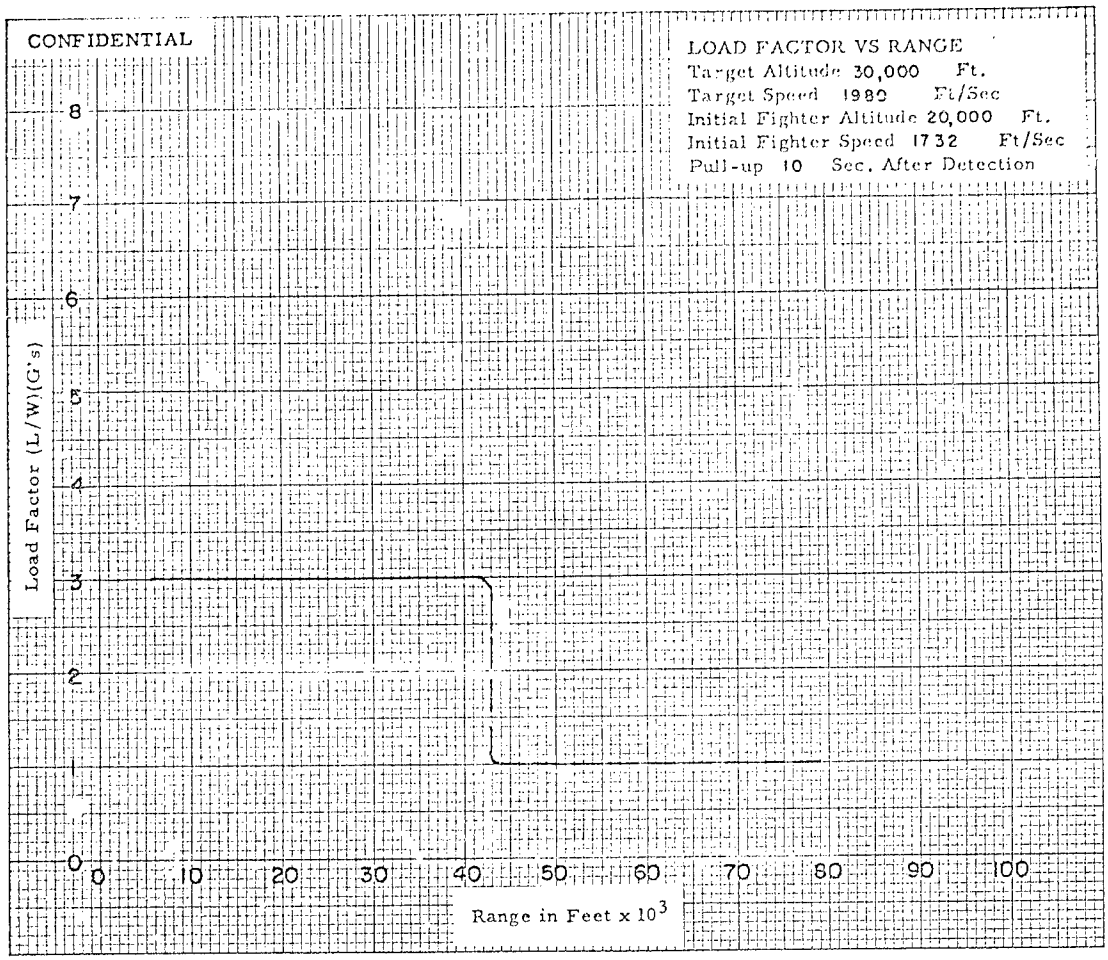
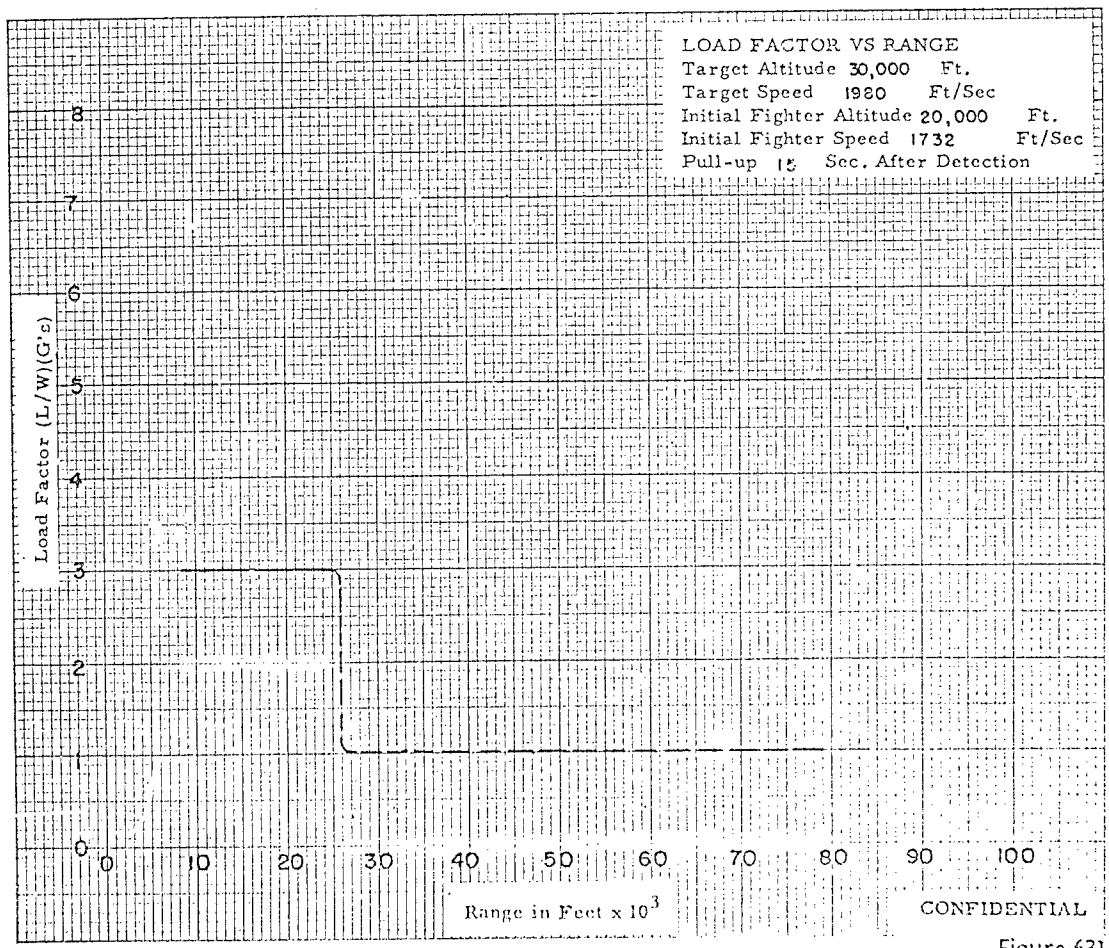

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 5 Sec. After Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

Figure 630

CONFIDENTIAL

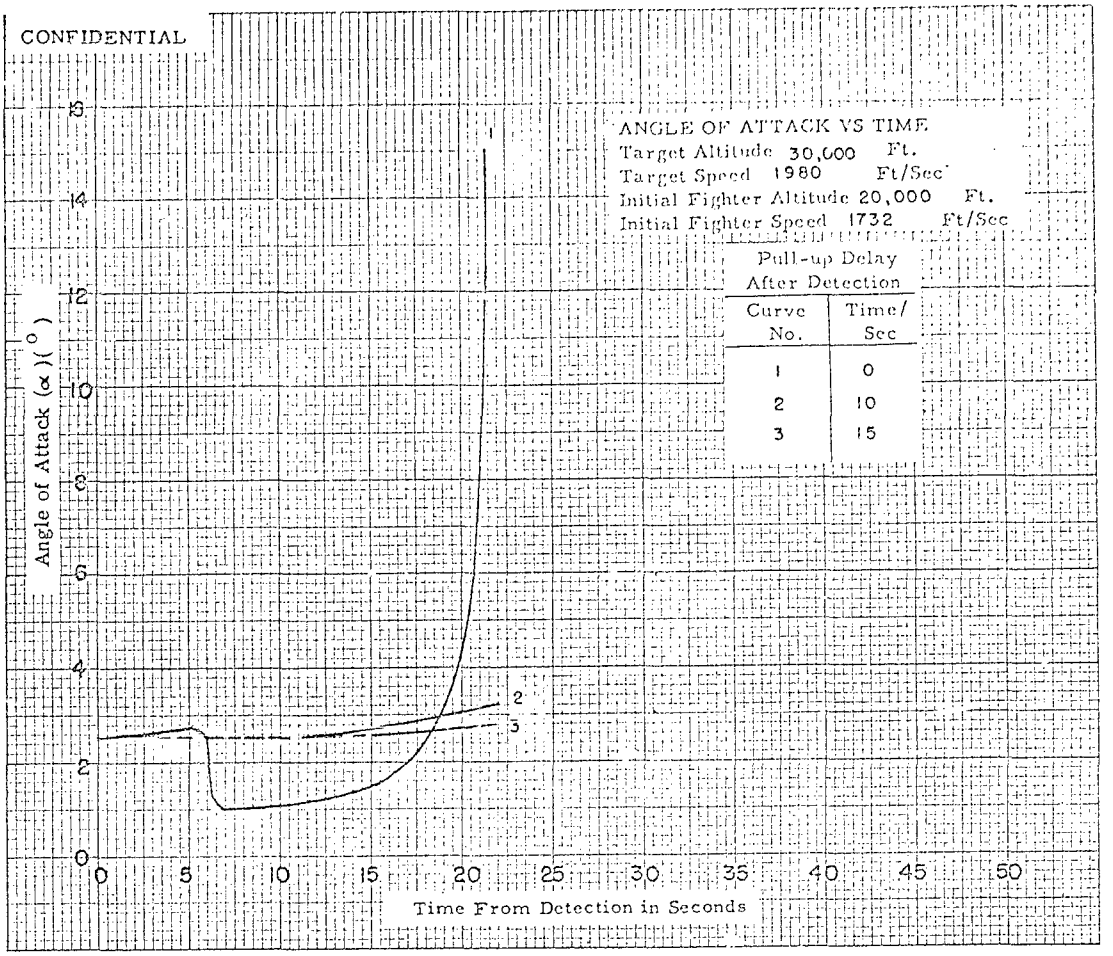


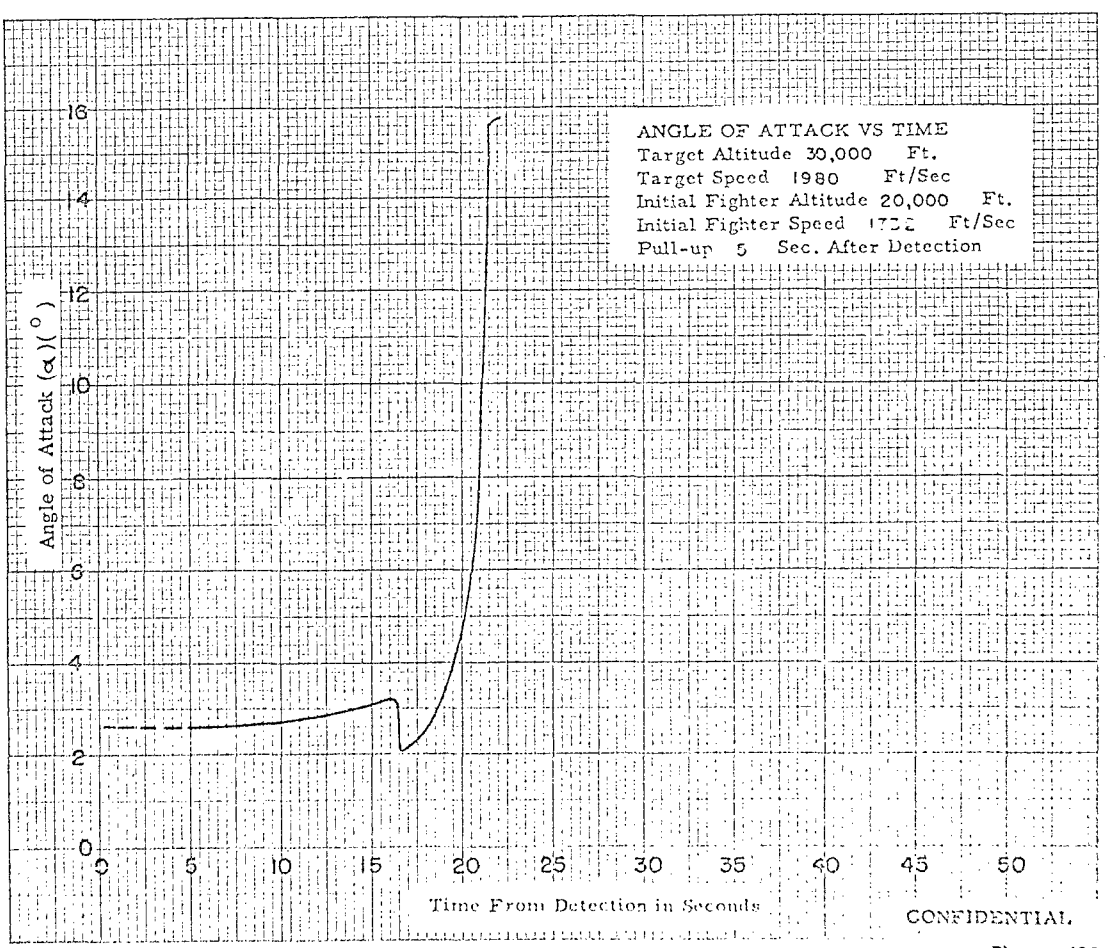


CONFIDENTIAL

Figure 631

CONFIDENTIAL





CONFIDENTIAL

Figure 632

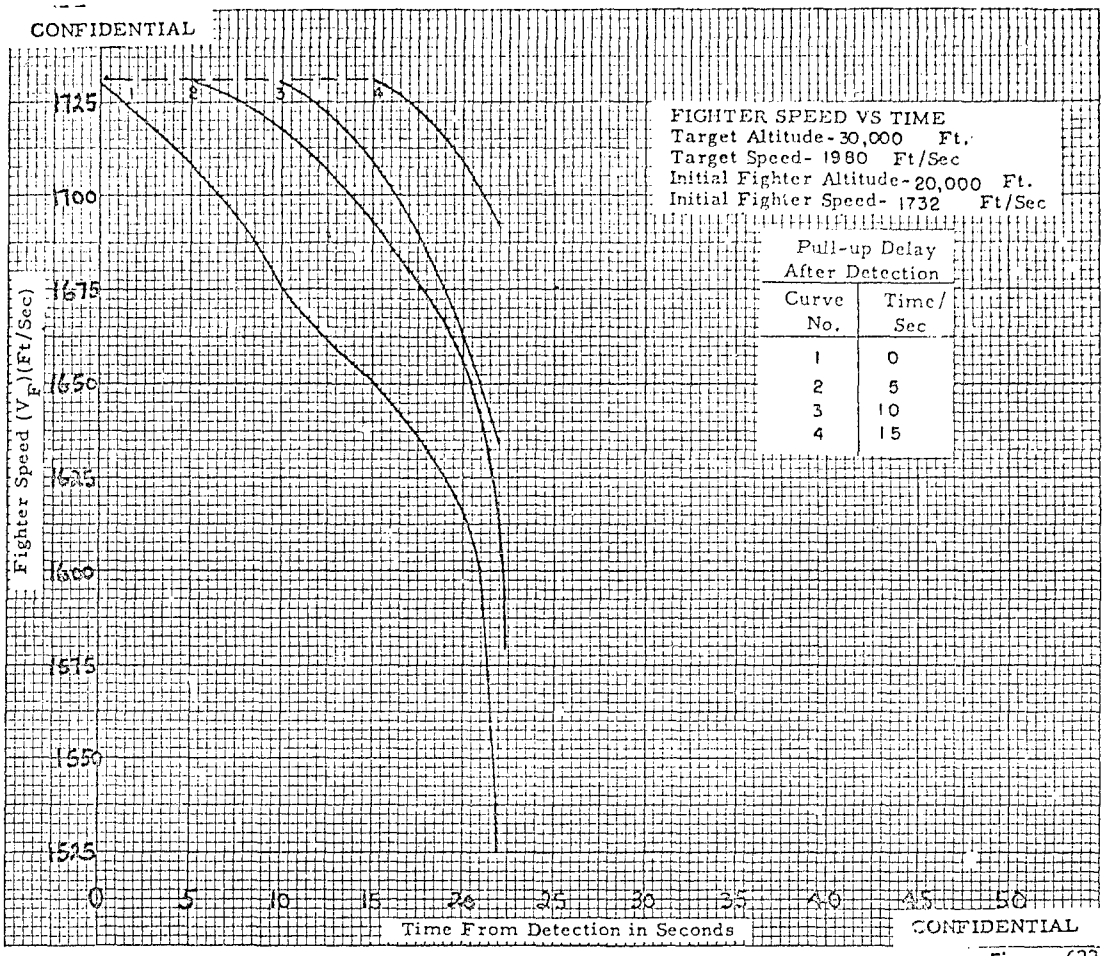


Figure 633

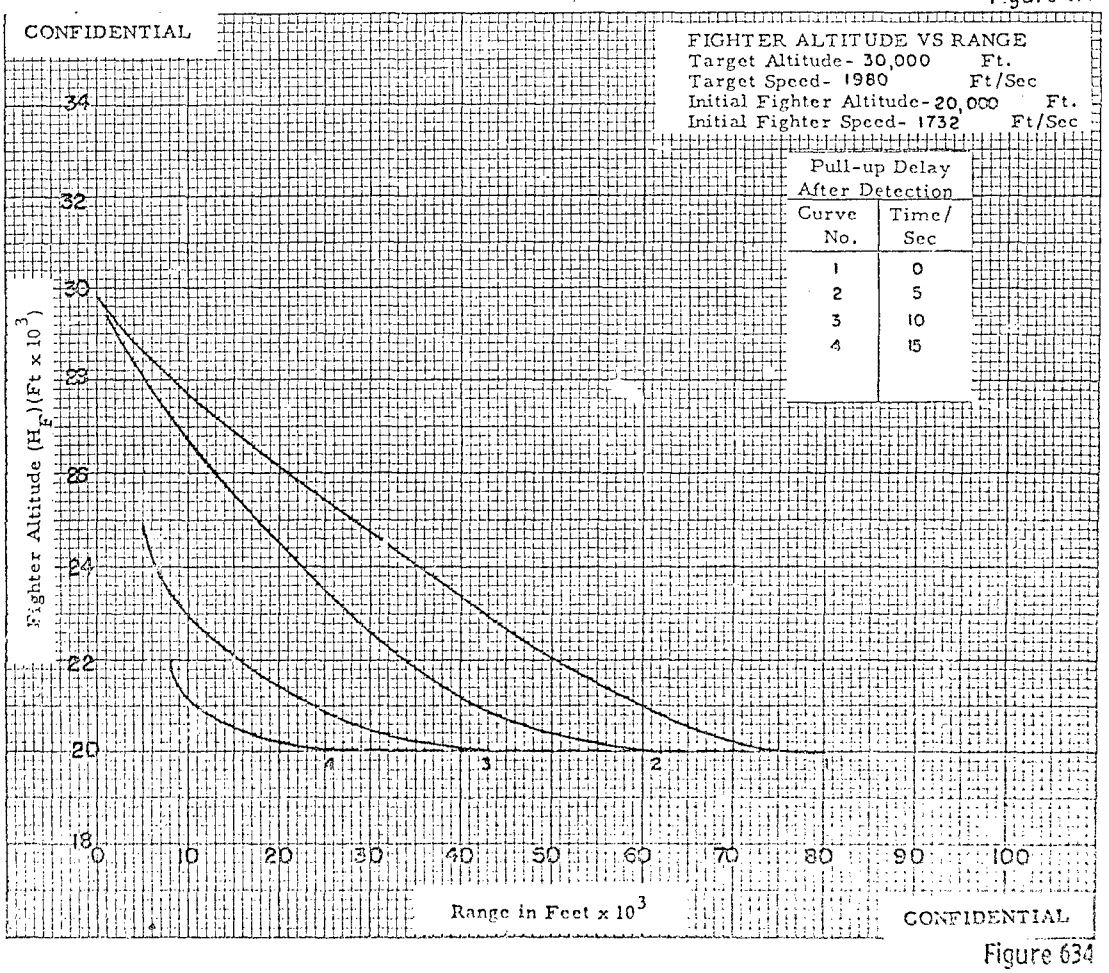
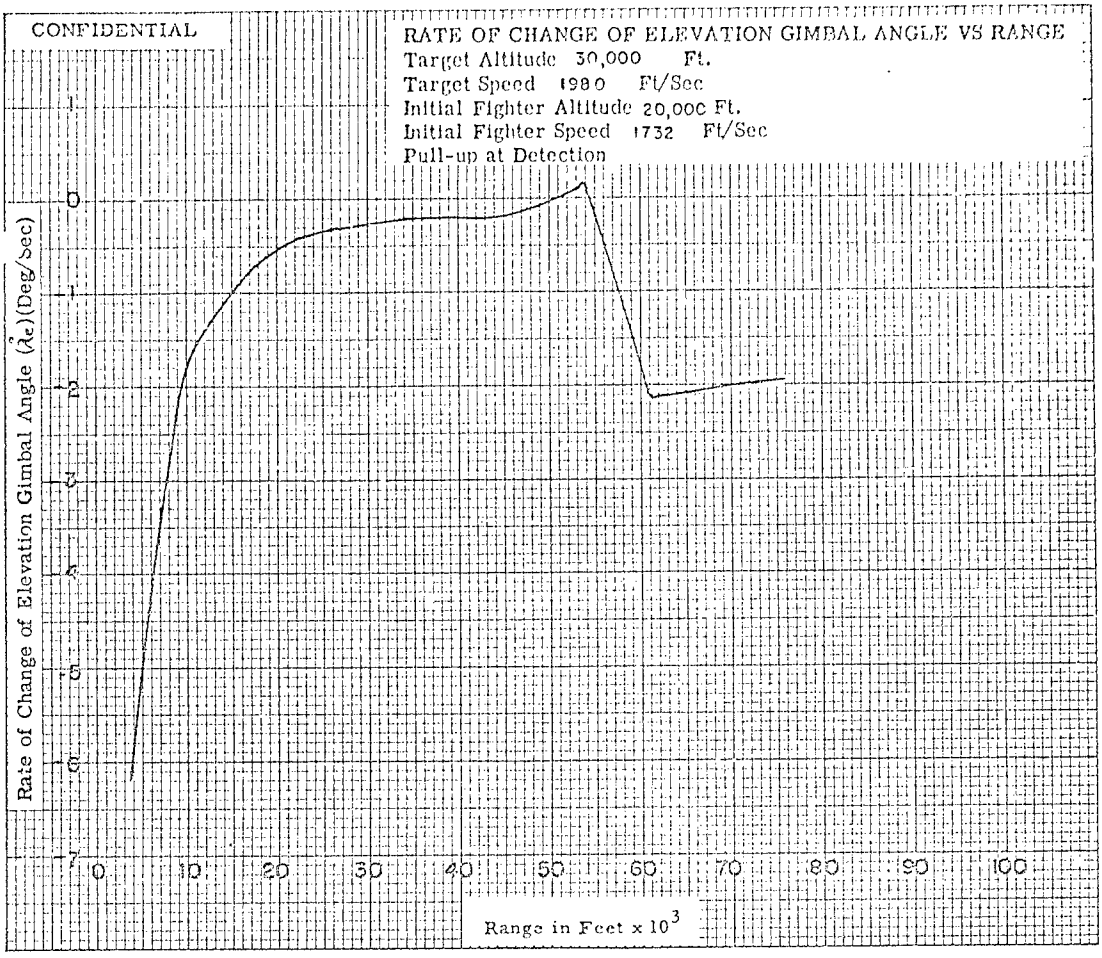


Figure 634

CONFIDENTIAL



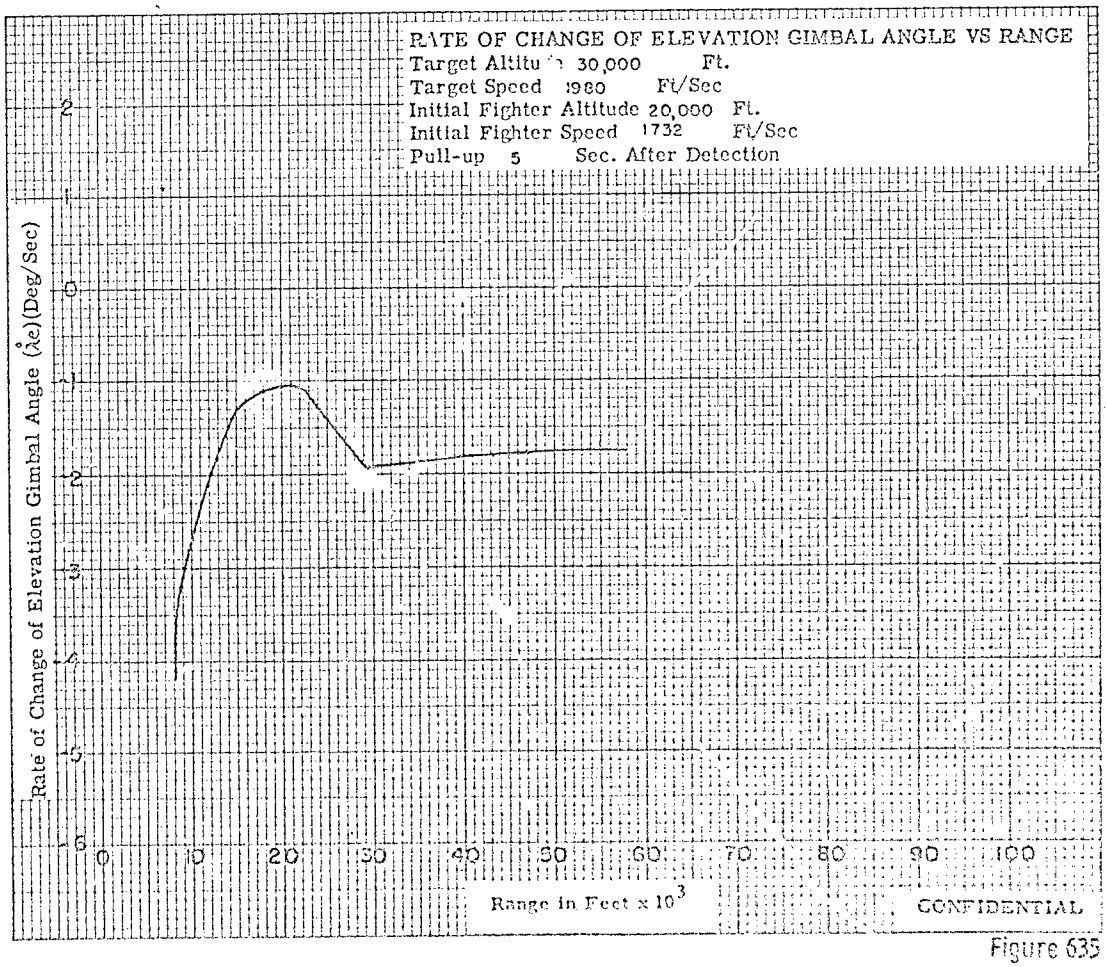
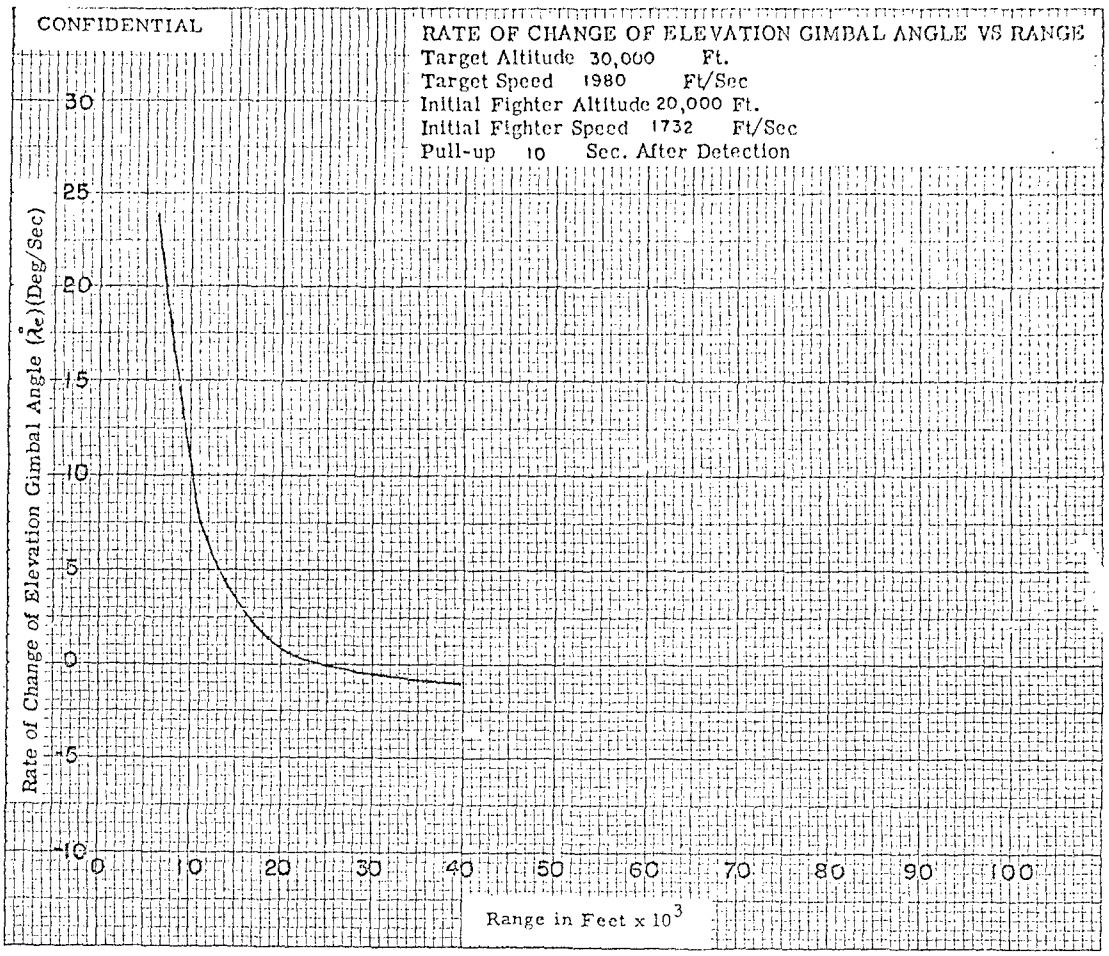
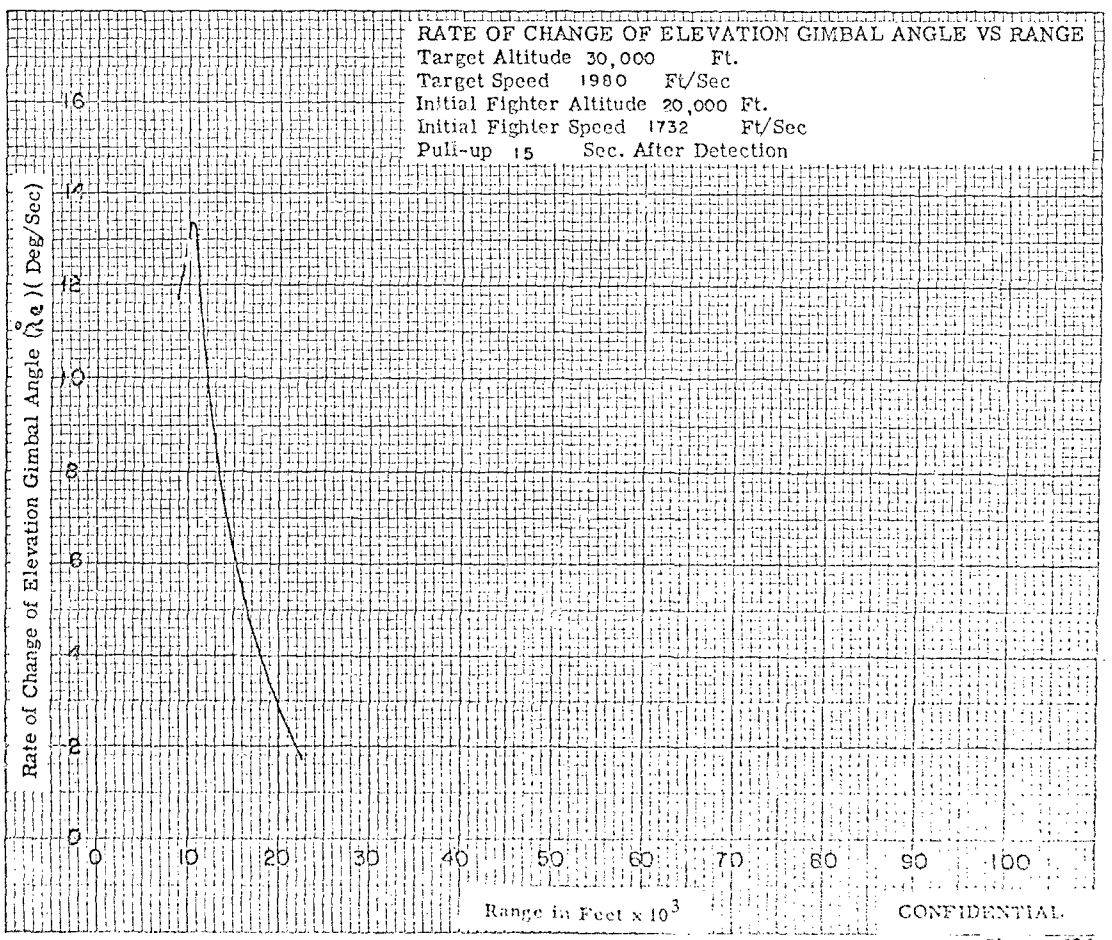


Figure 635

CONFIDENTIAL

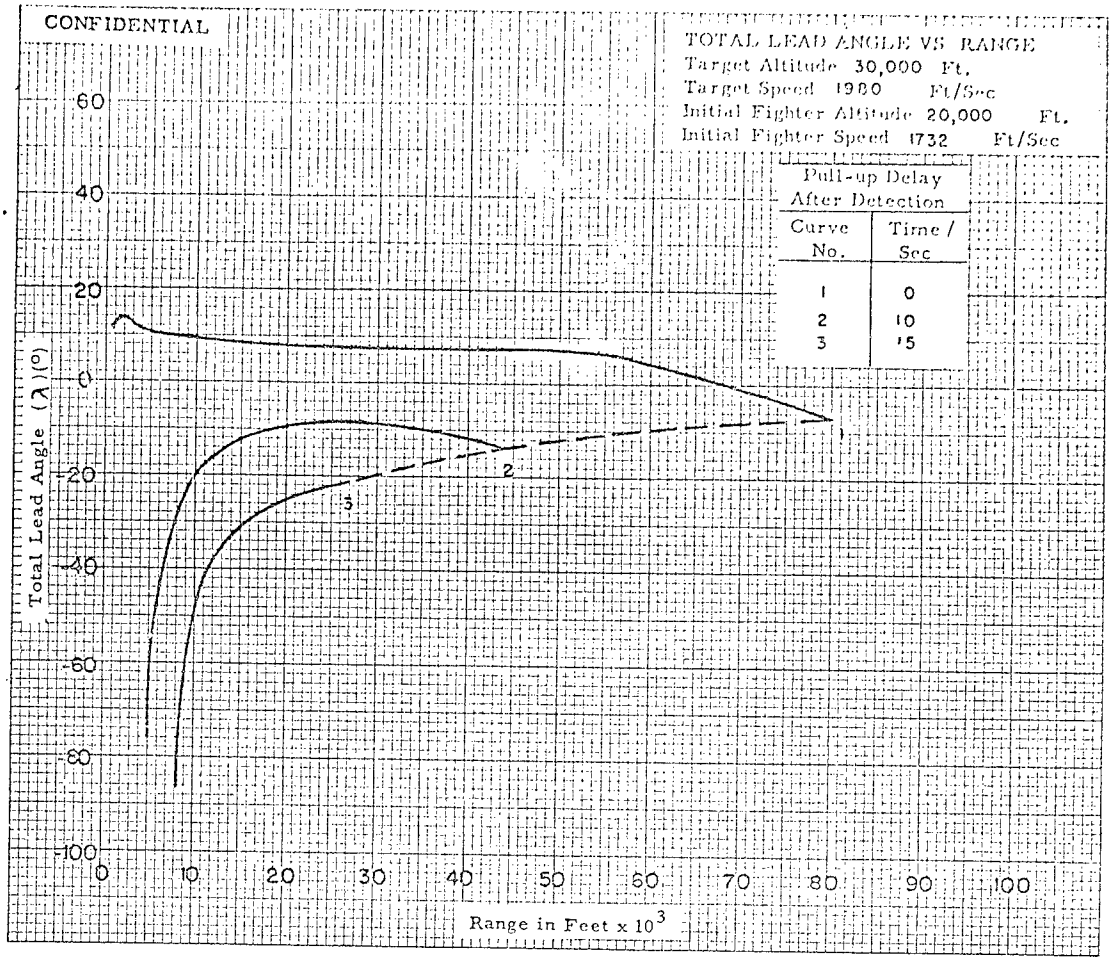


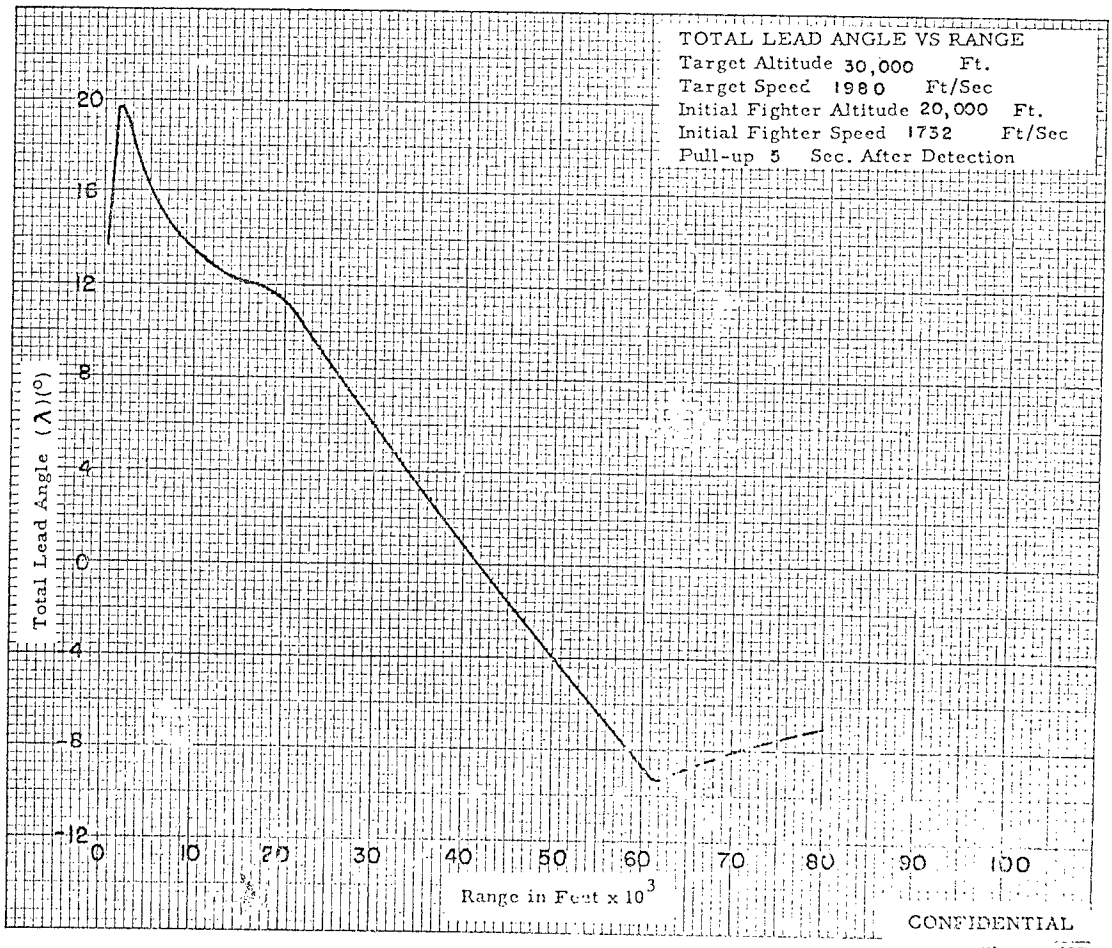


CONFIDENTIAL

Figure 636

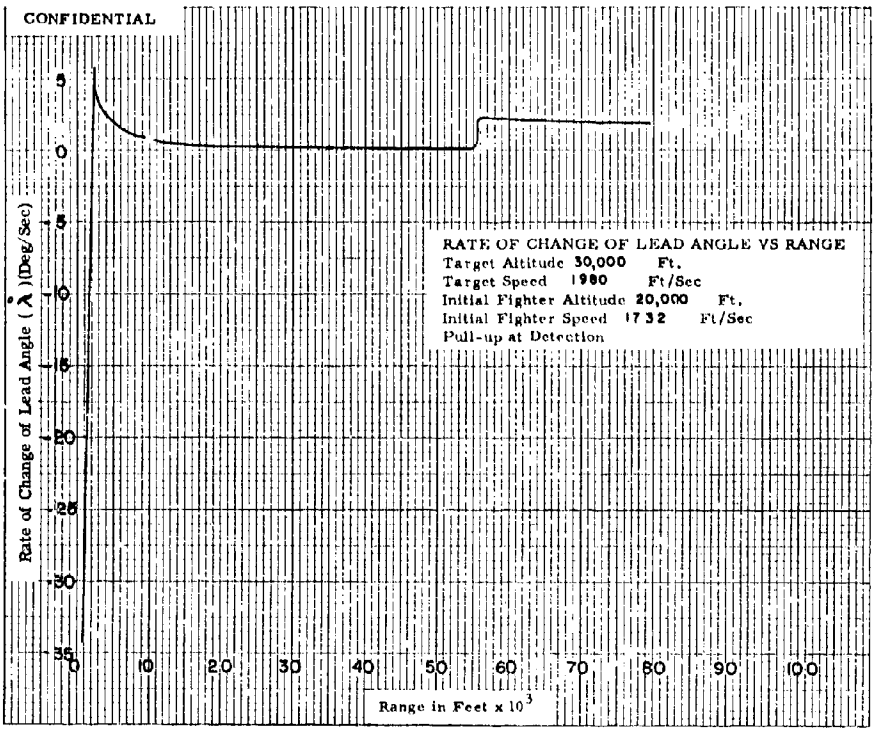
CONFIDENTIAL





CONFIDENTIAL

Figure 637


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
5
0
-5
-10
-15
-20
-25
-30
-35
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

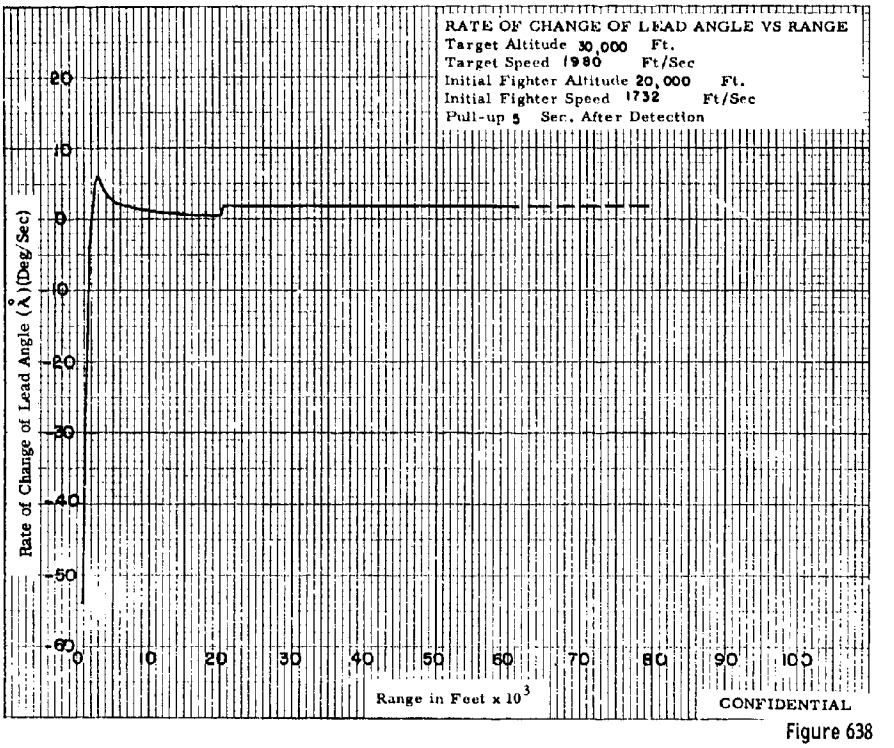
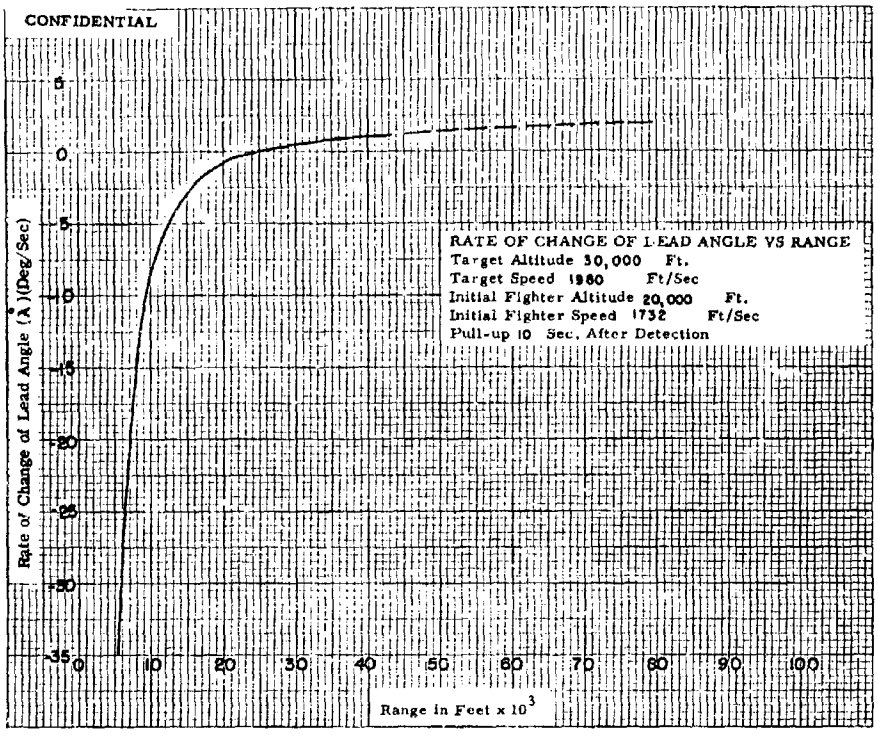

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
20
10
0
-10
-20
-30
-40
-50
-60
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 638


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
Range in Feet x 10³
5
0
-5
-10
-15
-20
-25
-30
-35
0
10
20
30
40
50
60
70
80
90
100

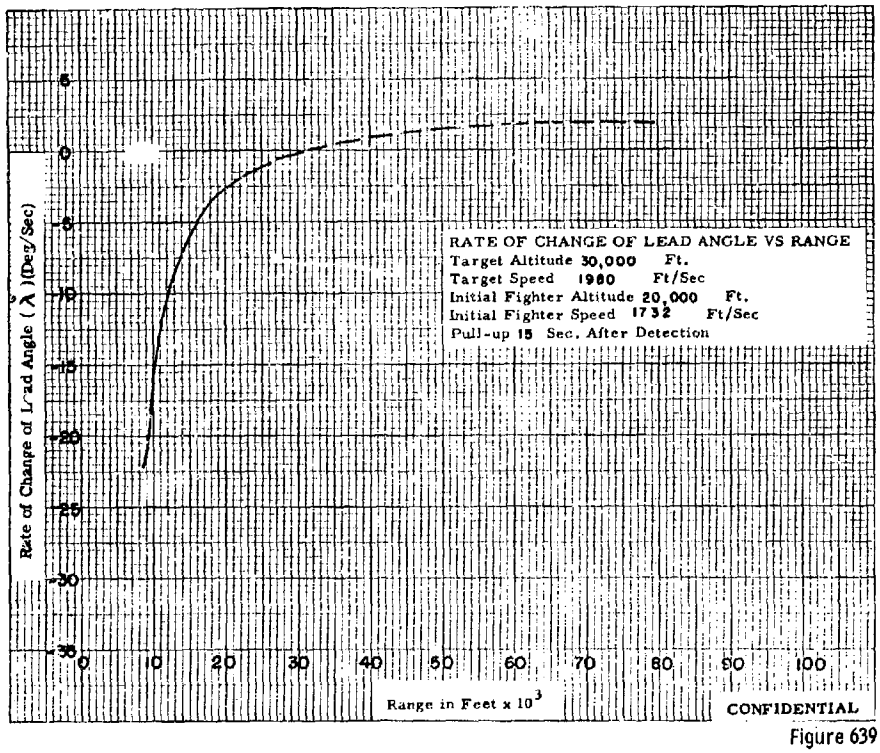
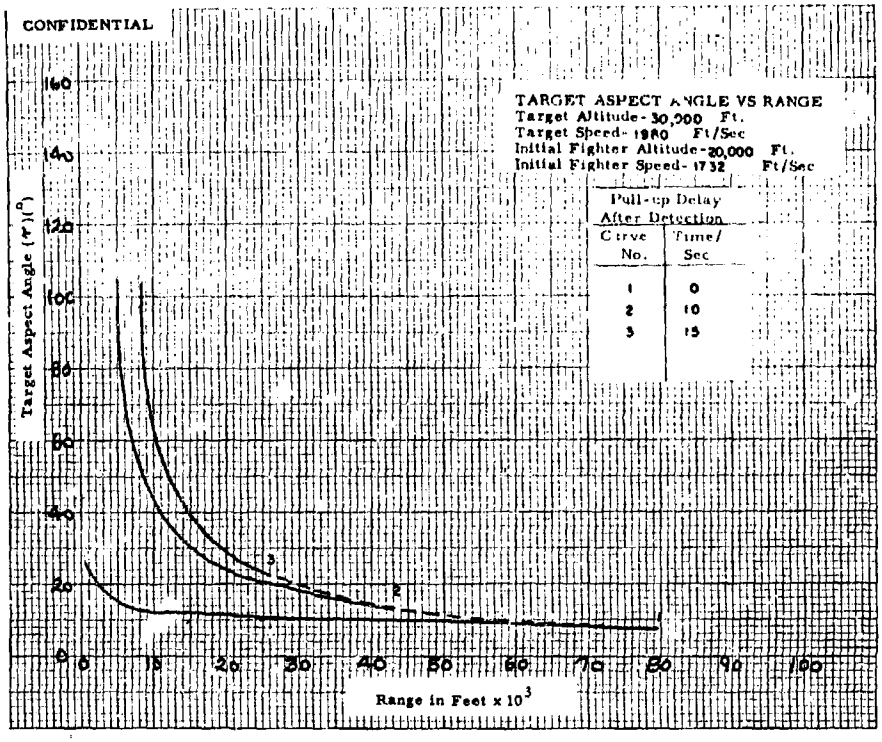

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
Range in Feet x 10³
5
0
-5
-10
-15
-20
-25
-30
-35
0
10
20
30
40
50
60
70
80
90
100

Figure 639


TARGET ASPECT ANGLE VS RANGE
Target Altitude- 30,000 Ft.
Target Speed- 1980 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 1732 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 15
Target Aspect Angle (ψ)(°)
Range in Feet x 10³

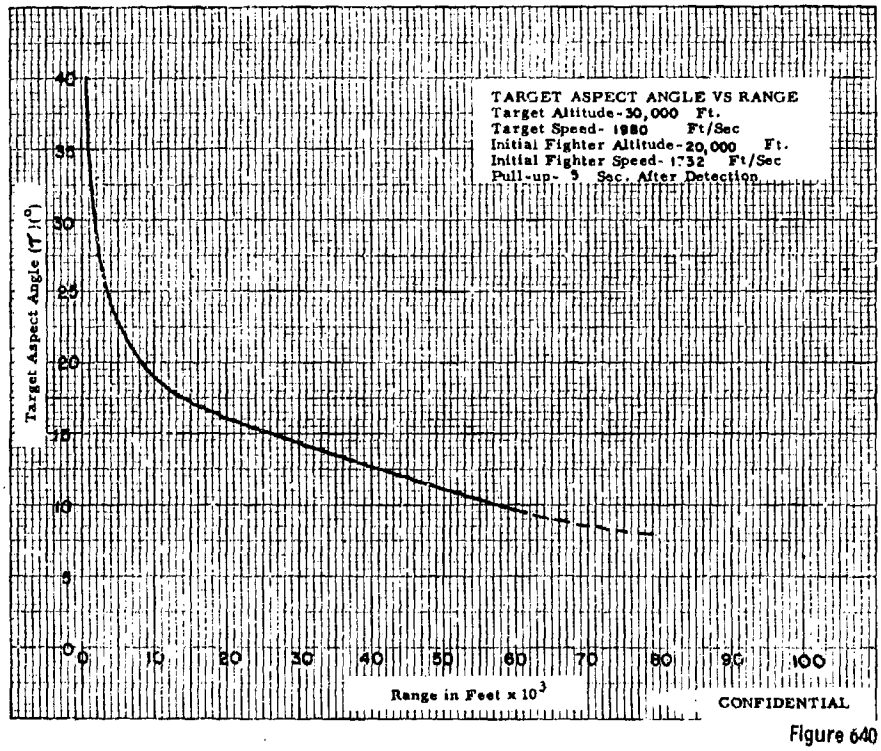
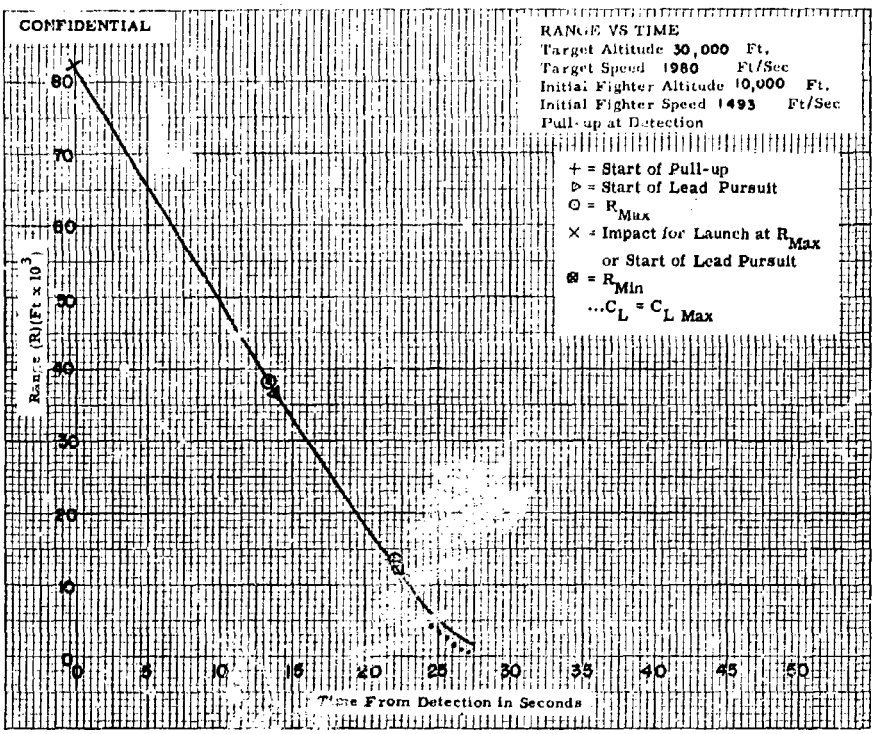

TARGET ASPECT ANGLE VS RANGE
Target Altitude- 30,000 Ft.
Target Speed- 1980 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 1732 Ft/Sec
Pull-up- 5 Sec. After Detection
Target Aspect Angle (ψ)(°)
Range in Feet x 10³

Figure 640


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

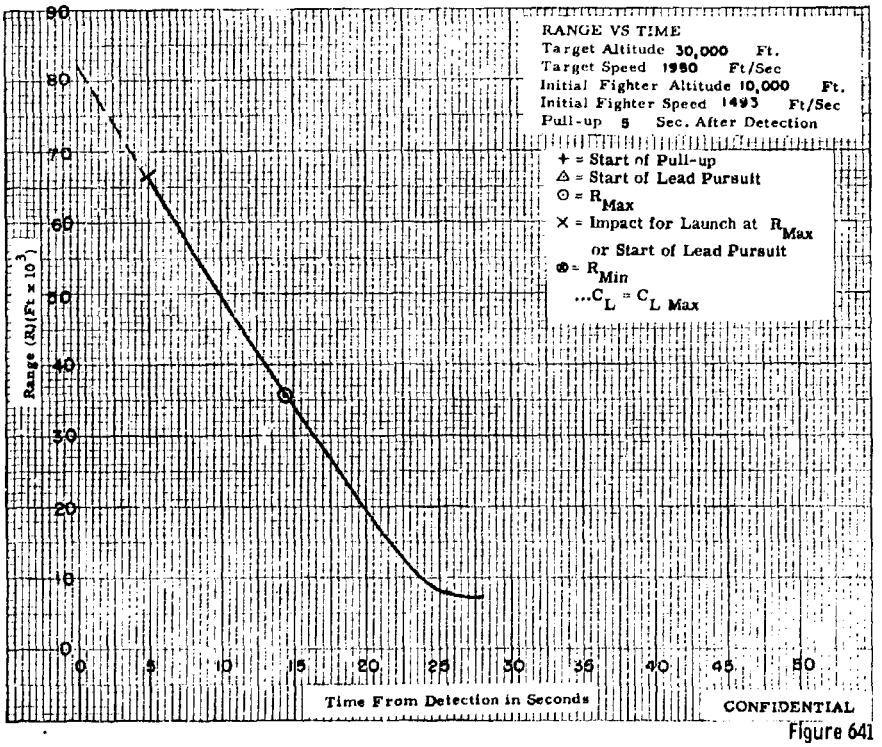
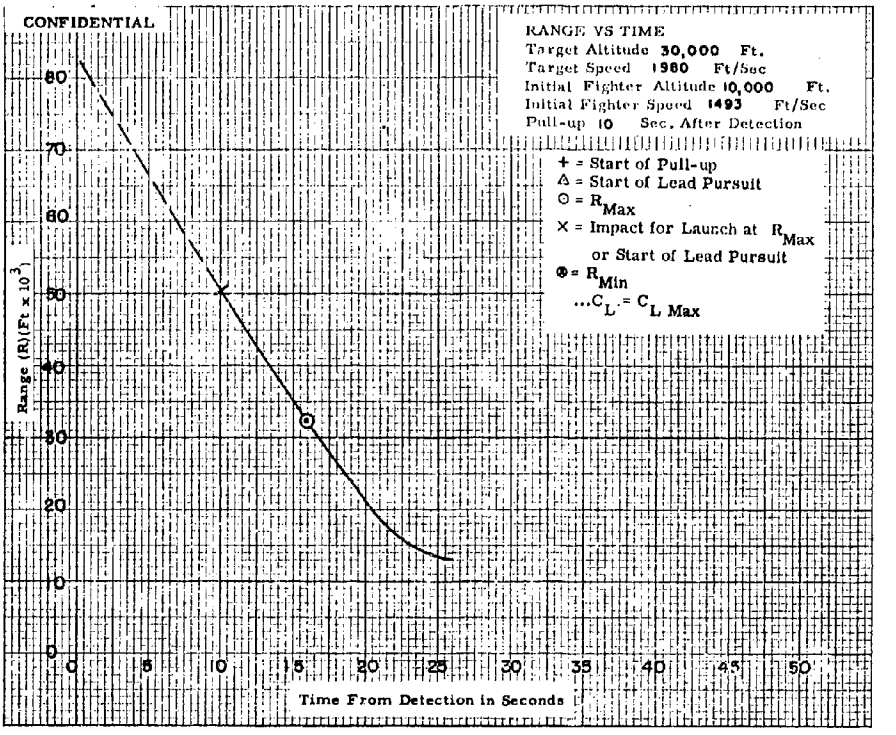

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 5 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 641


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
0 10 20 30 40 50 60 70 80
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds

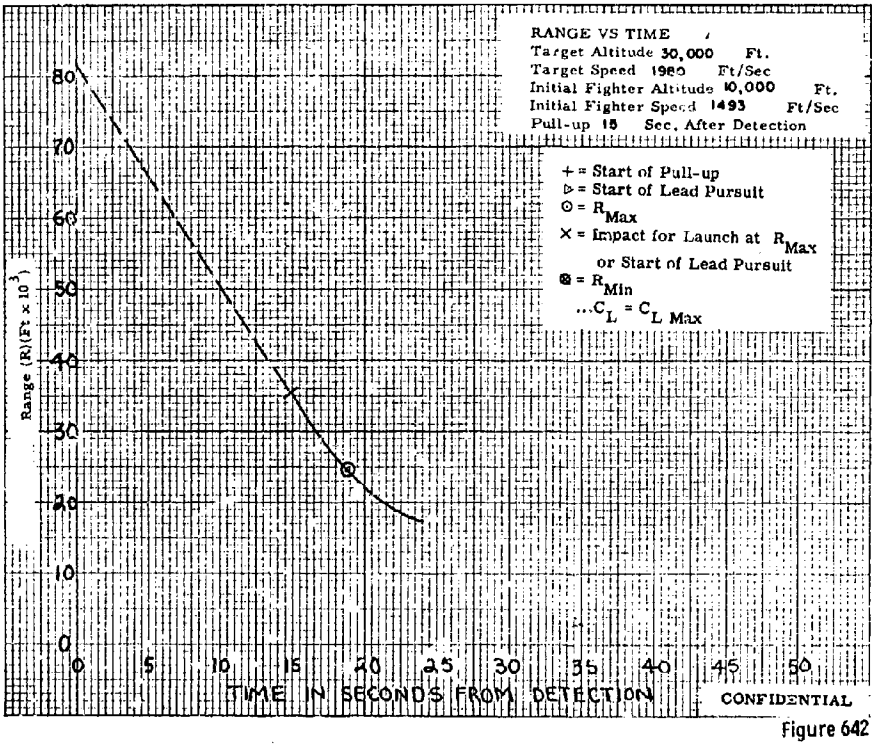
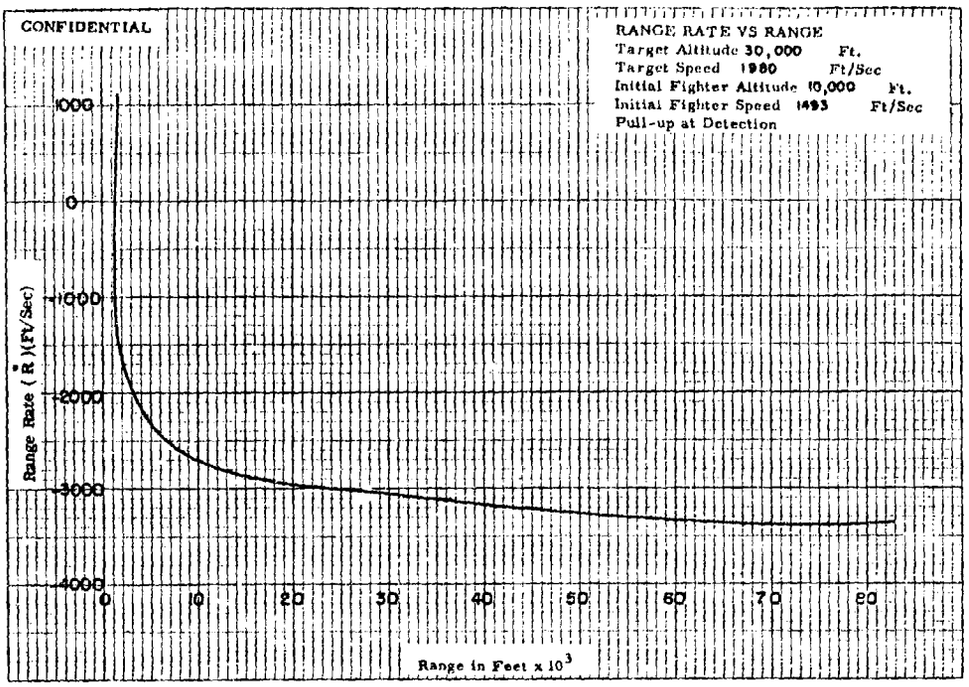

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
0 10 20 30 40 50 60 70 80
0 5 10 15 20 25 30 35 40 45 50
TIME IN SECONDS FROM DETECTION
CONFIDENTIAL

Figure 642


RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up at Detection
1000
0
-1000
-2000
-3000
-4000
Range Rate (Ṙ)(Ft/Sec)
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

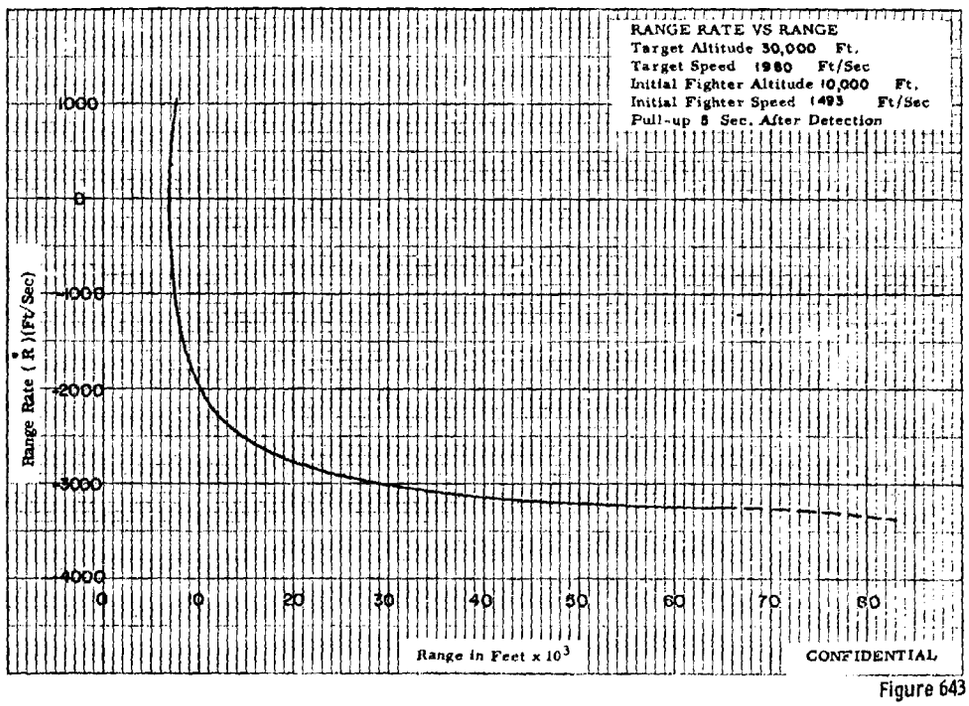
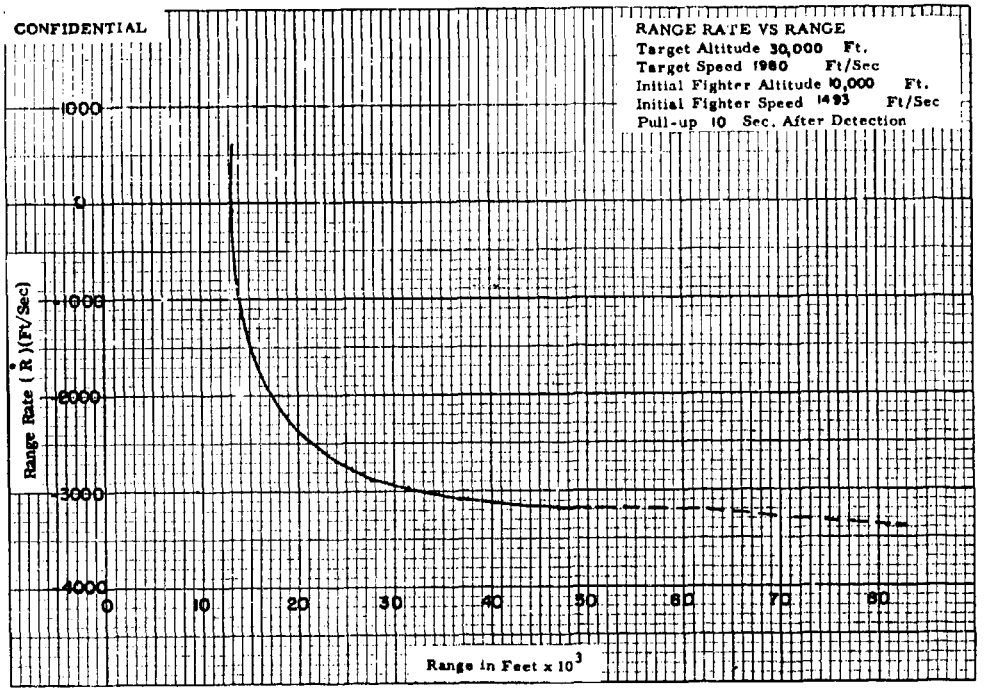

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 8 Sec. After Detection
1000
0
-1000
-2000
-3000
-4000
Range Rate (Ṙ)(Ft/Sec)
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

Figure 643


RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

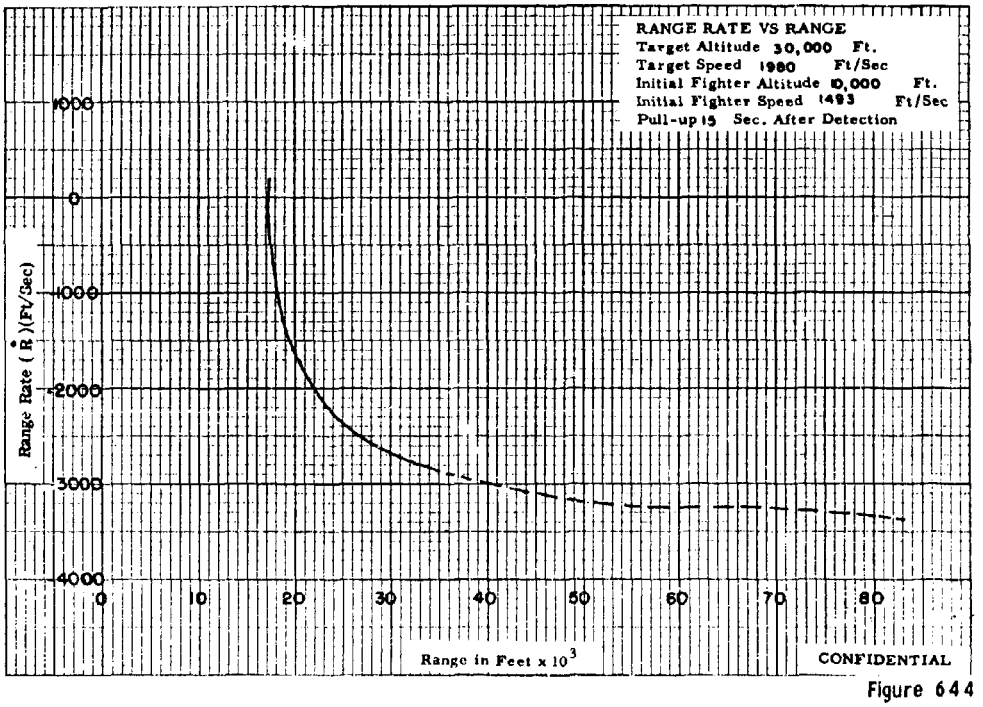

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 15 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 644

CONFIDENTIAL

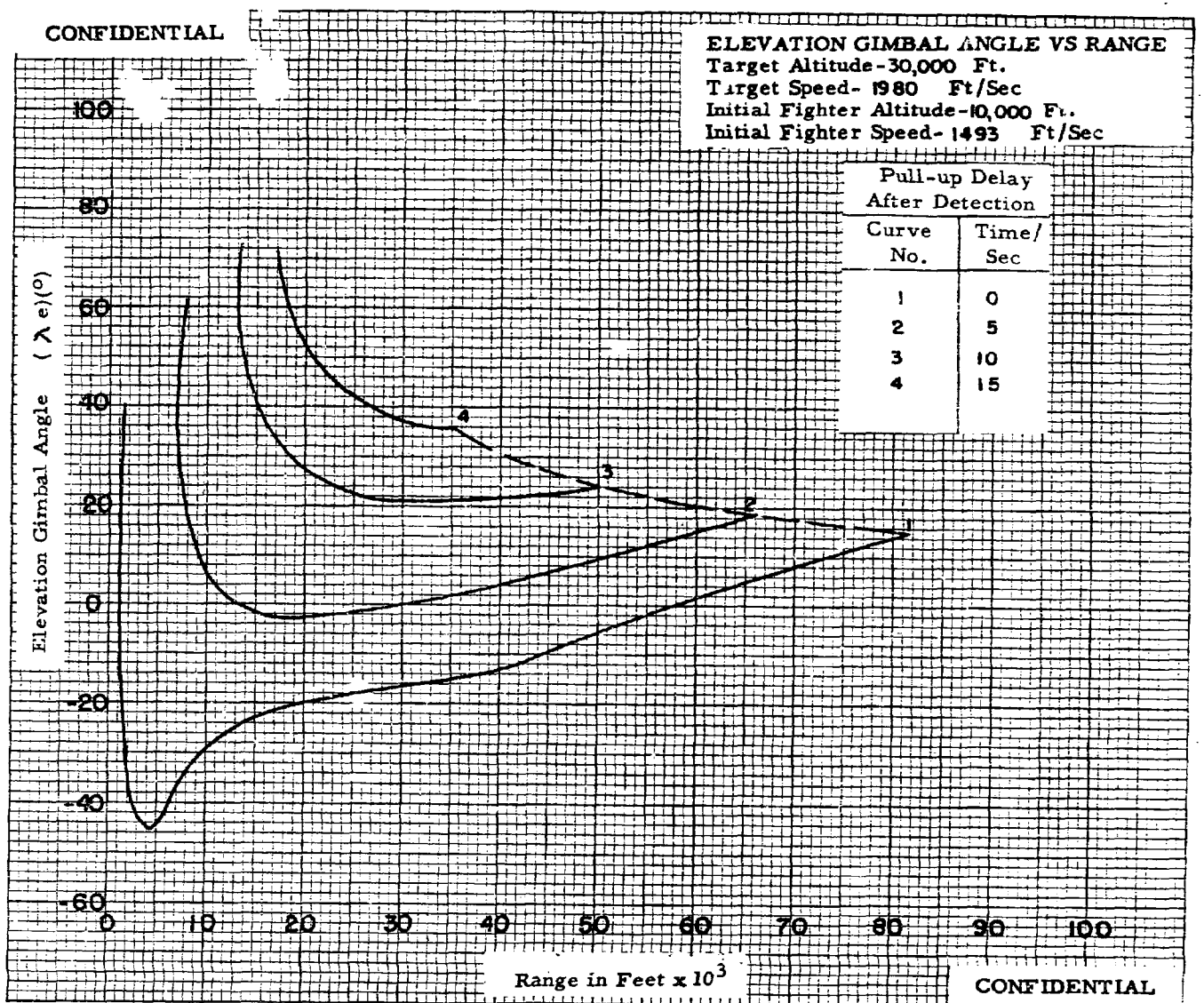
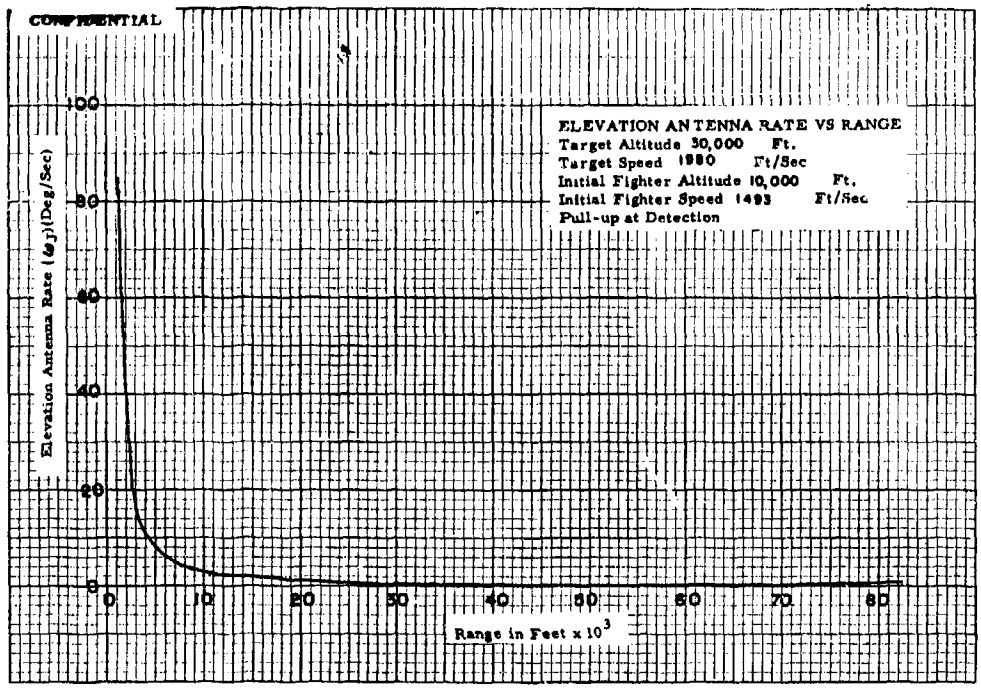


Figure 645


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up at Detection
Elevation Antenna Rate (ω_y)(Deg/Sec)
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

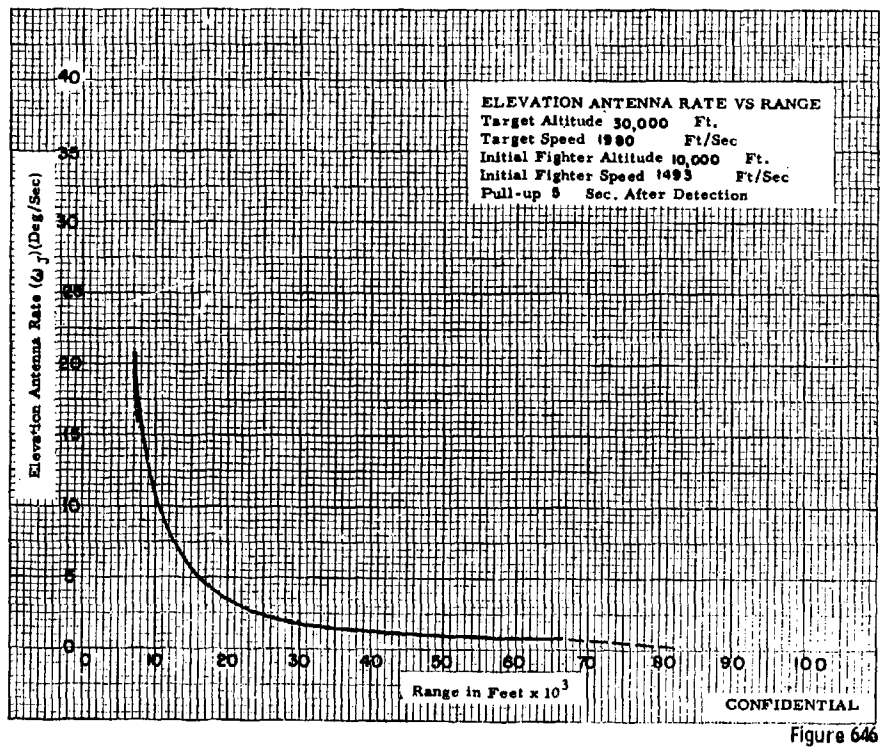

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 5 Sec. After Detection
Elevation Antenna Rate (ω_y)(Deg/Sec)
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 646

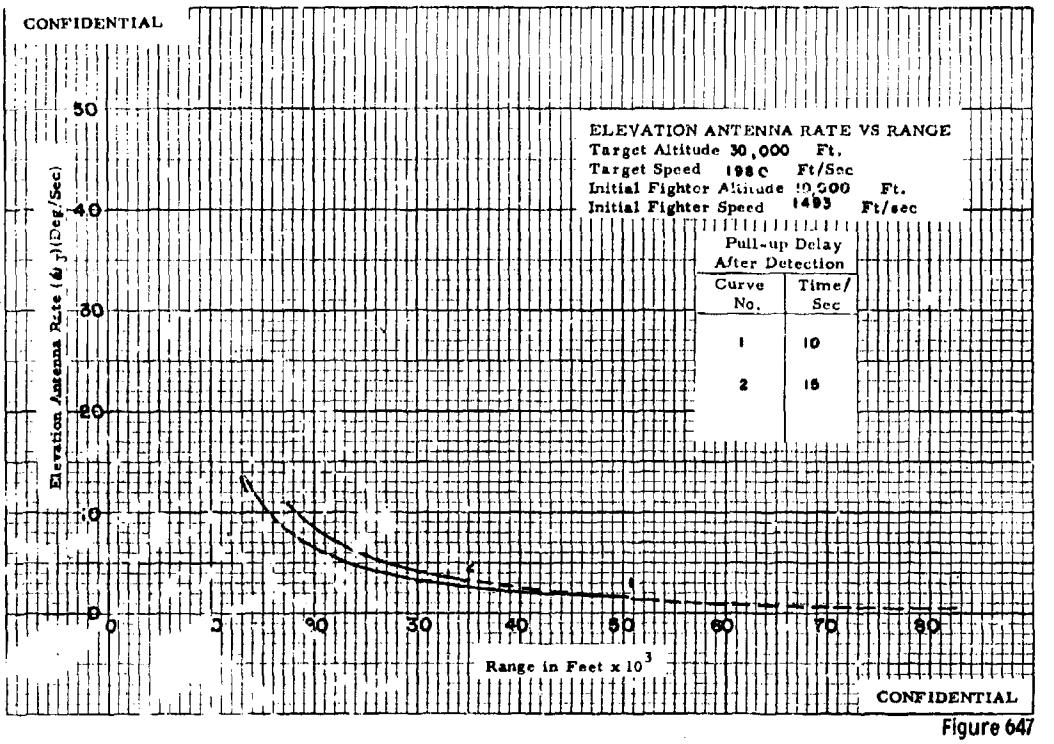


Figure 647

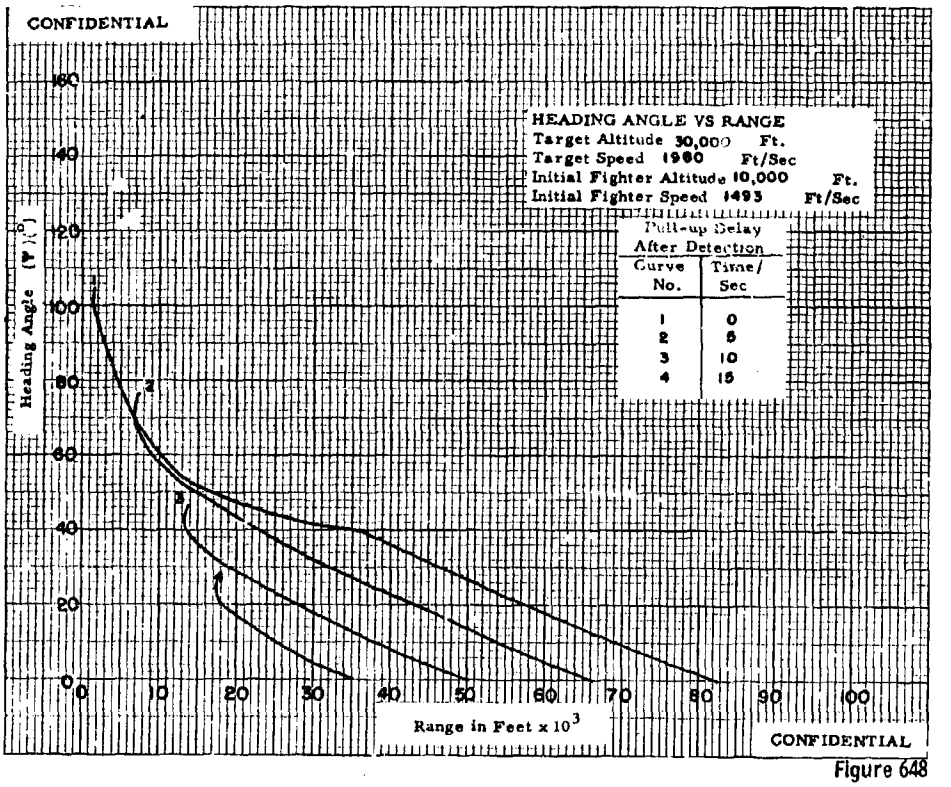
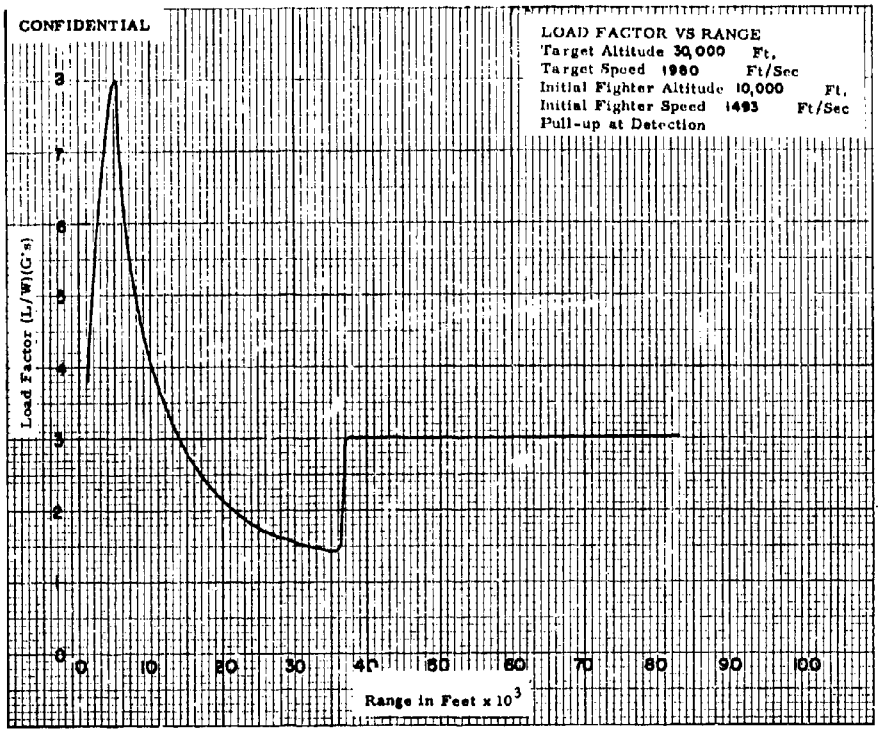


Figure 648


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90
100

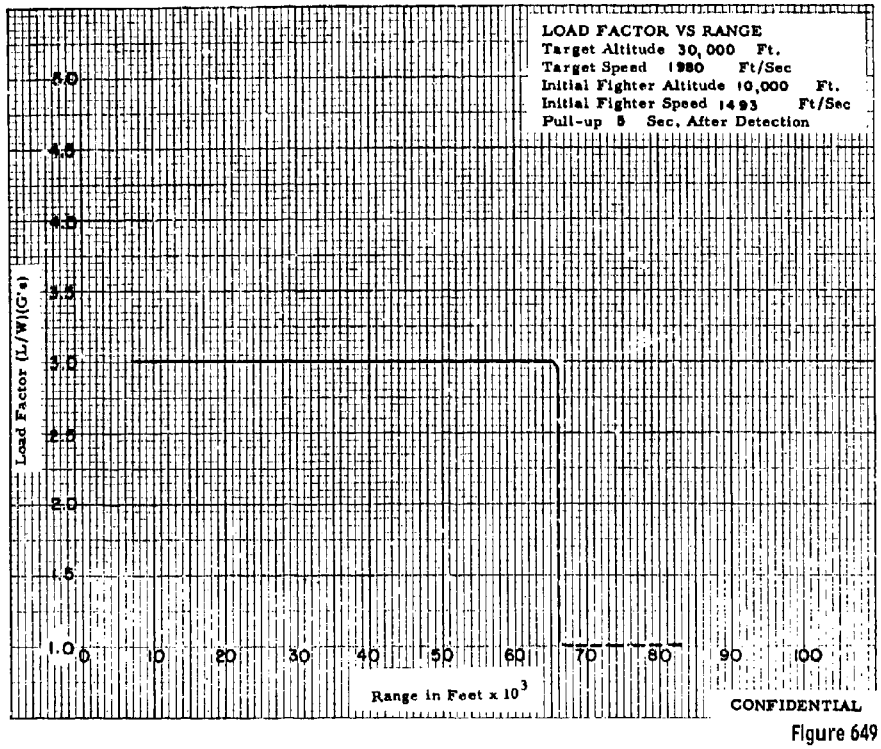
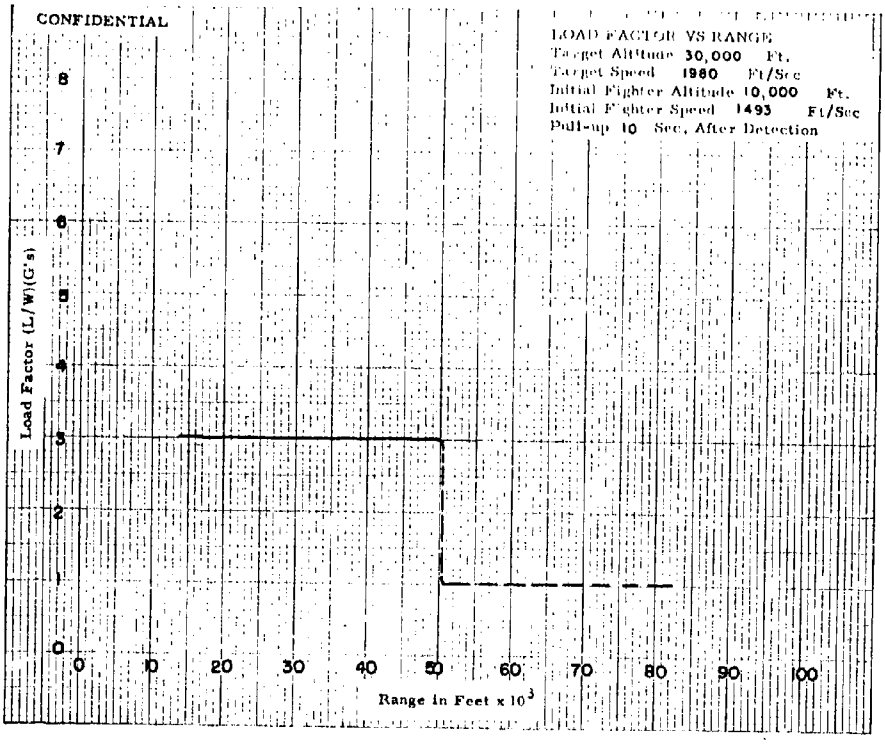

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 5 Sec. After Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

Figure 649


LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
0
1
2
3
4
5
6
7
8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

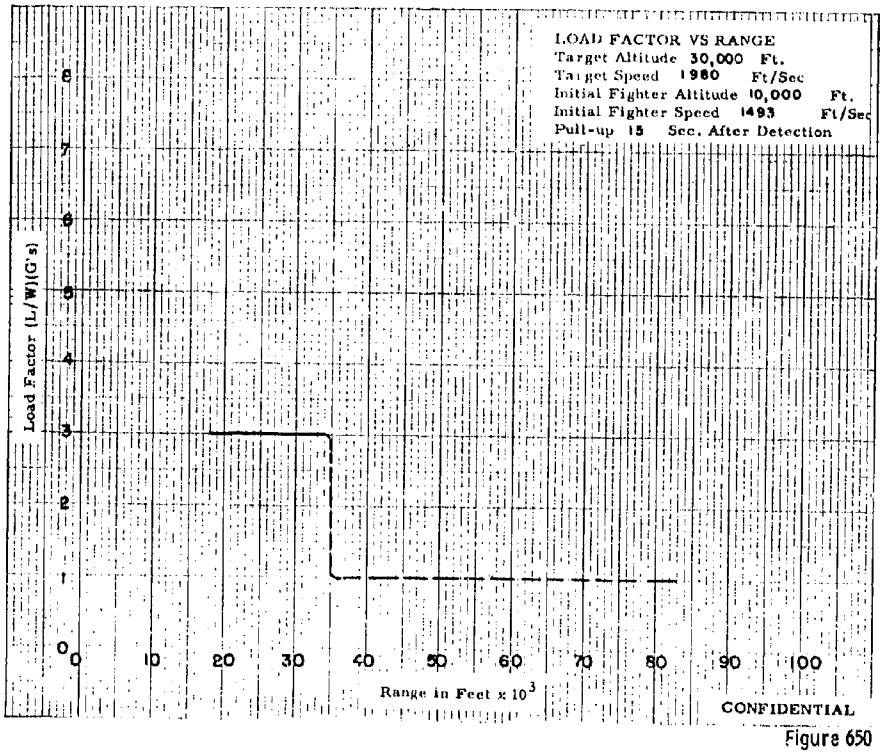
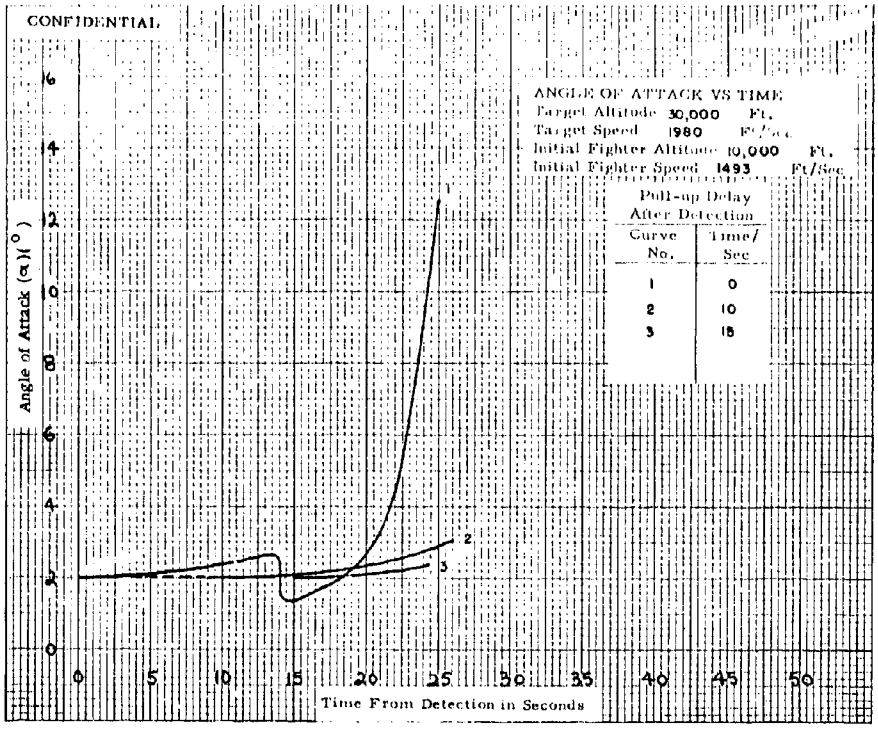

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 15 Sec. After Detection
Load Factor (L/W)(G's)
0
1
2
3
4
5
6
7
8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 650


ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
3 | 18
Angle of Attack (α)(°)
Time From Detection in Seconds

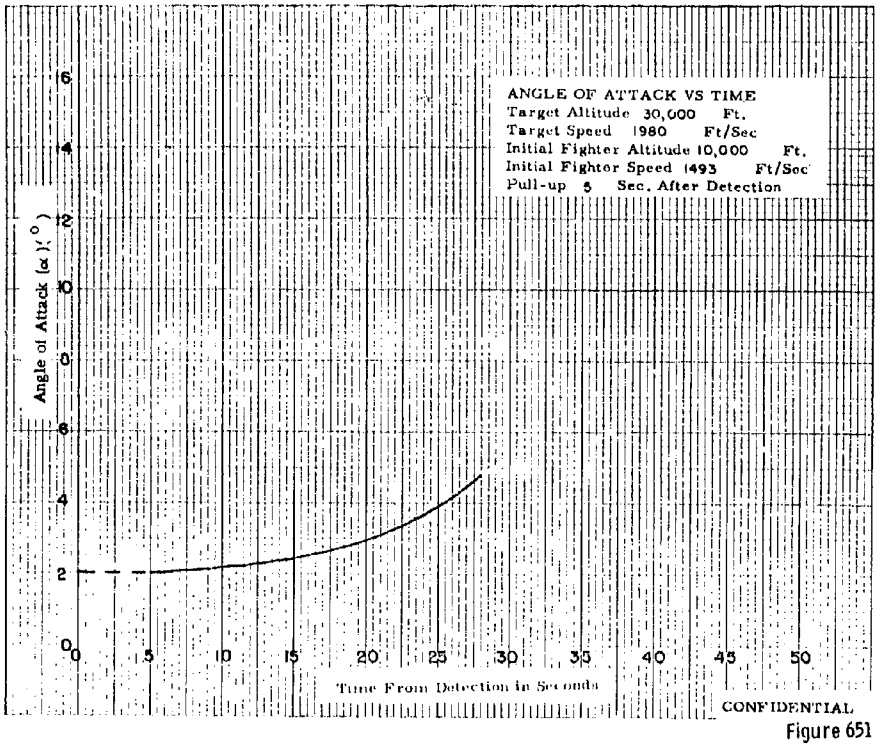

ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 5 Sec. After Detection
Angle of Attack (α)(°)
Time From Detection in Seconds

Figure 651

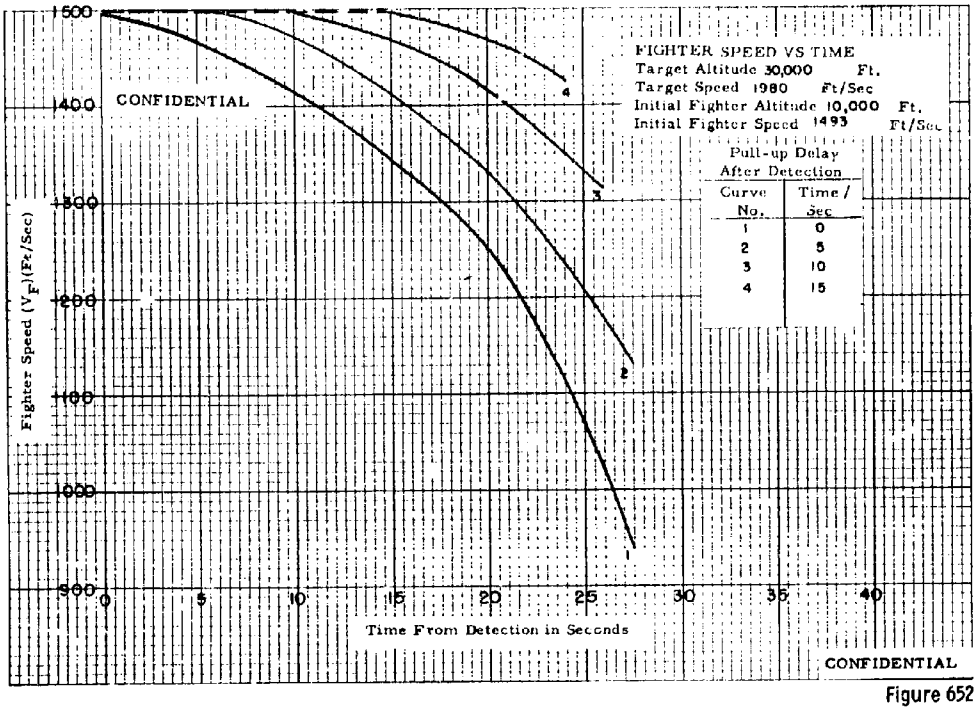


Figure 652

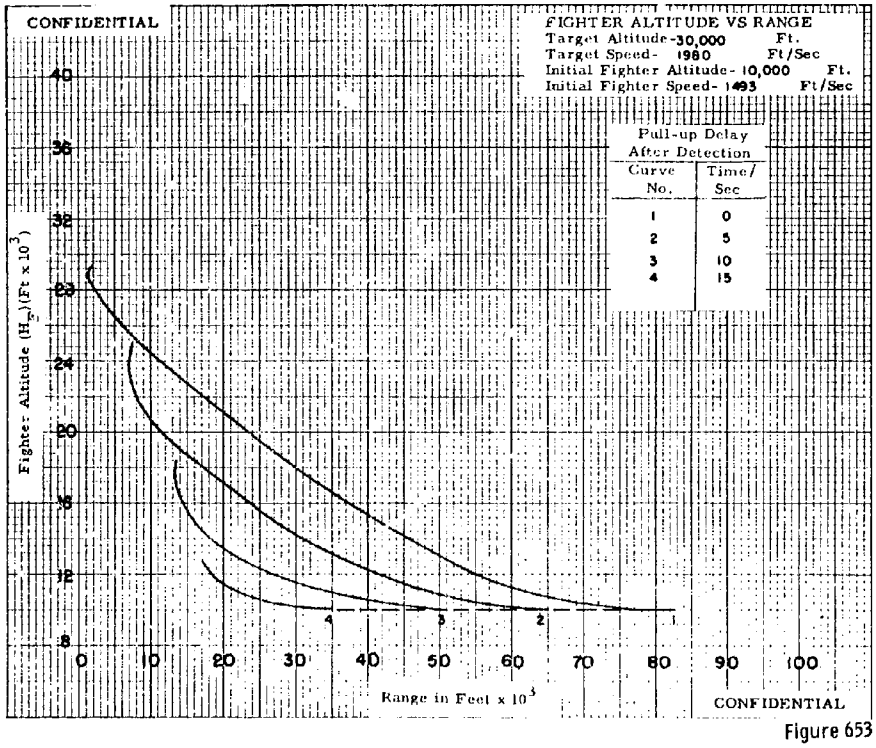
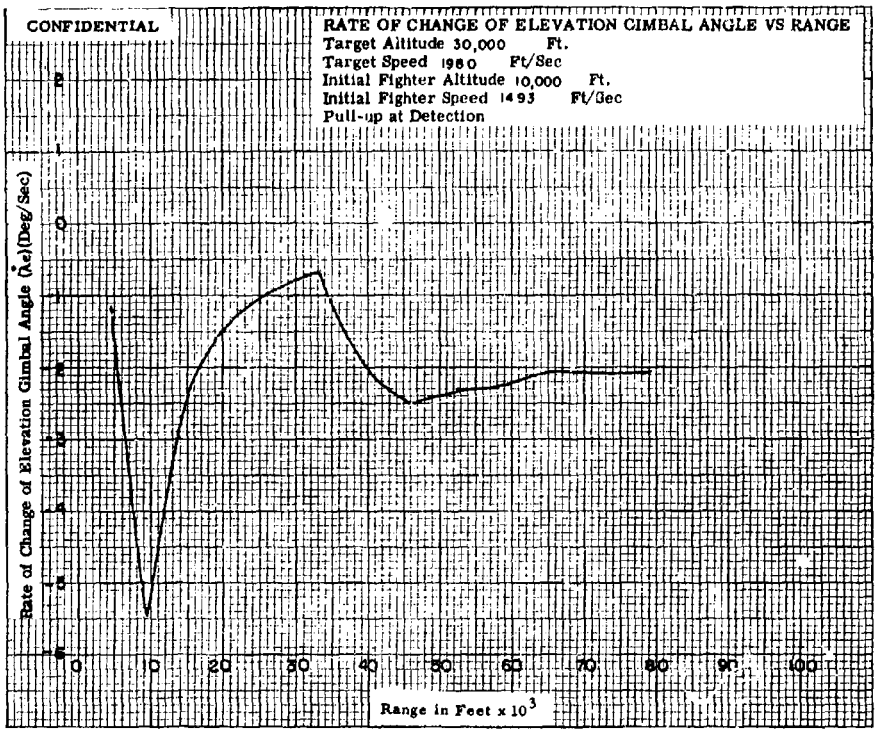


Figure 653


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
Range in Feet x 10^3

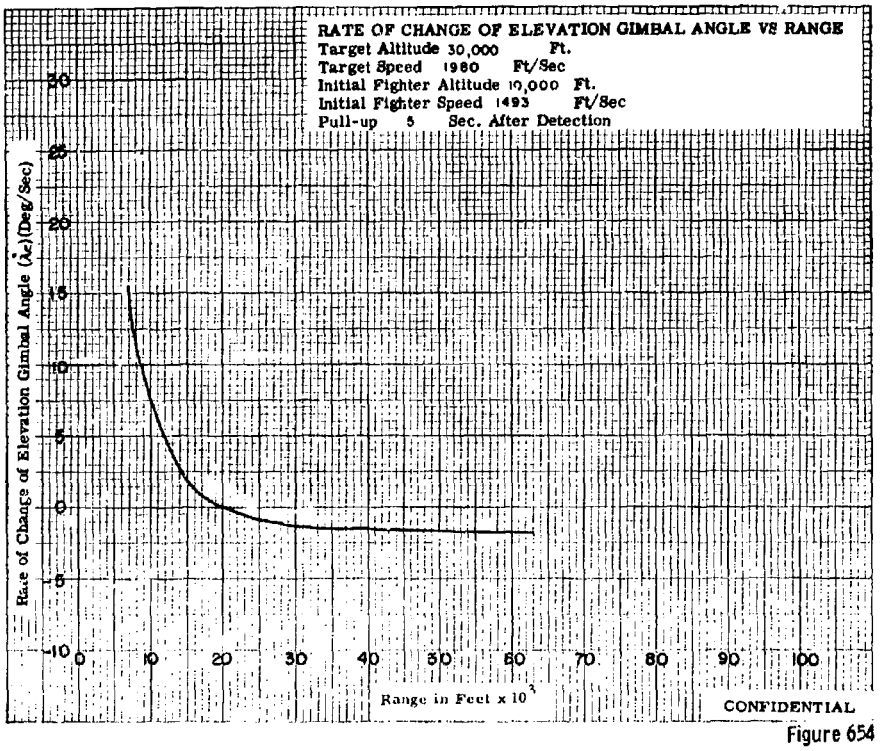
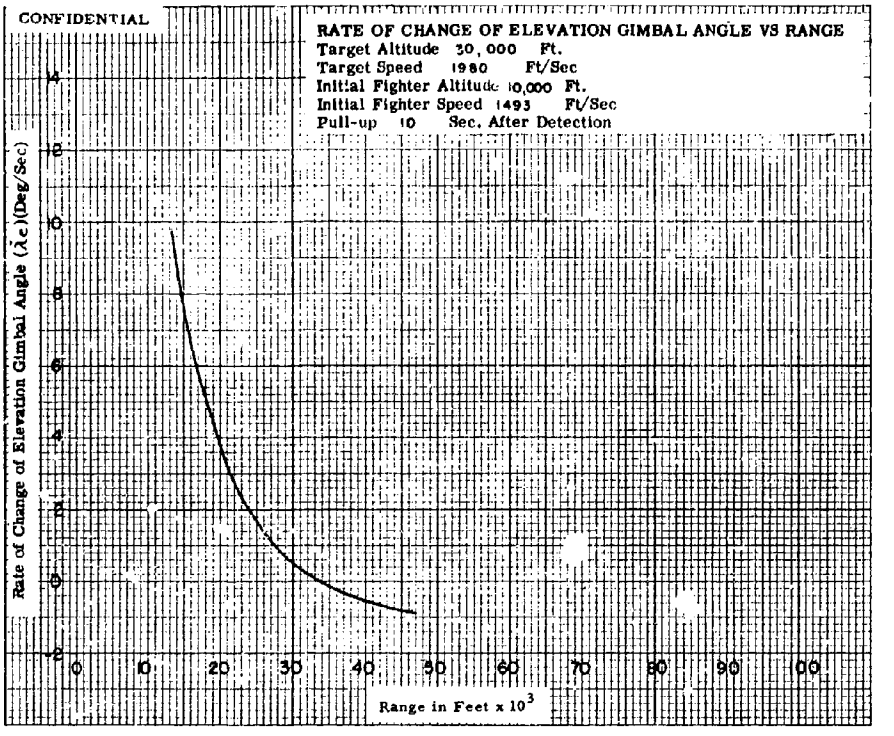
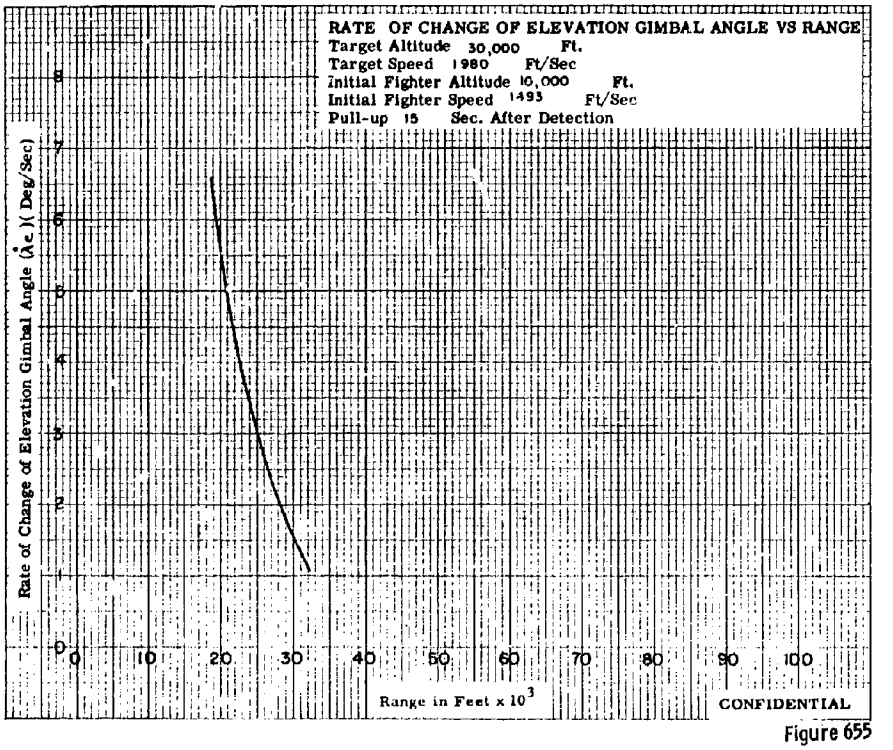

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 654

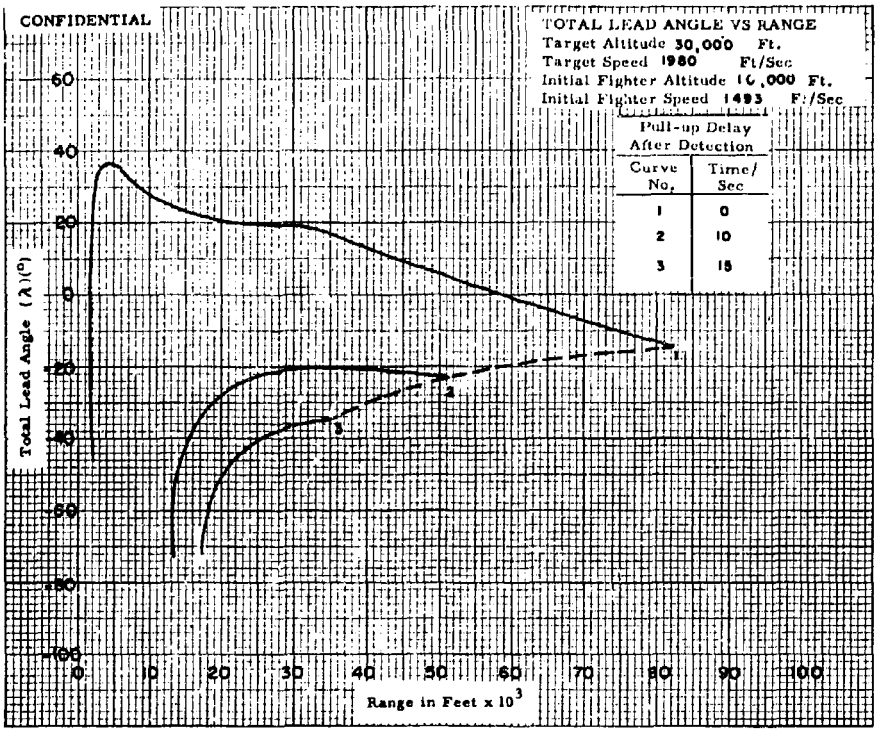
CONFIDENTIAL





CONFIDENTIAL

Figure 655


TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
3 | 15
Total Lead Angle (λ)(°)
Range in Feet x 10³

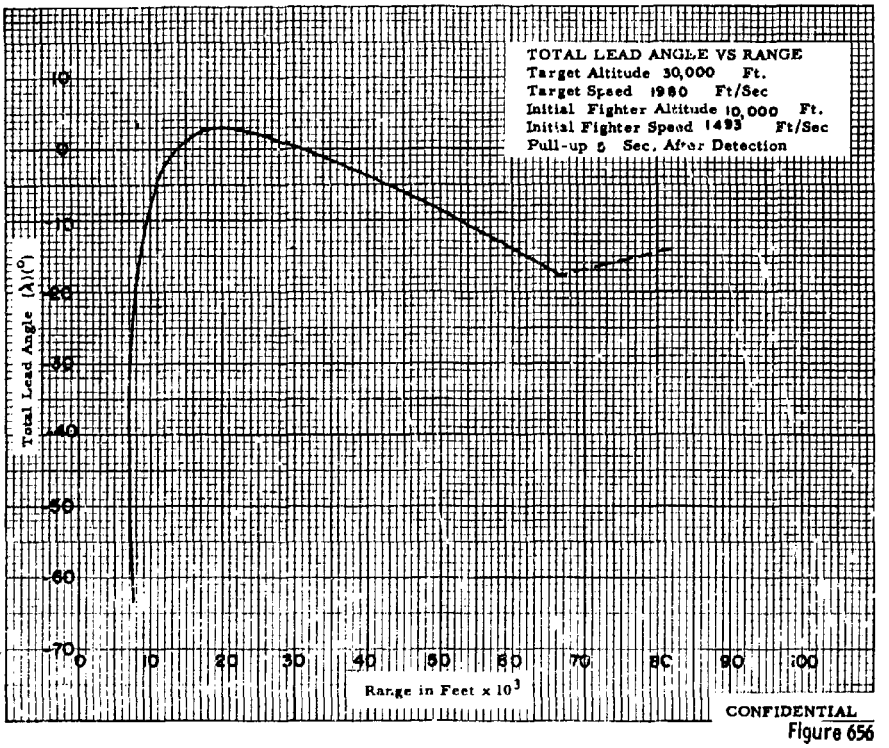
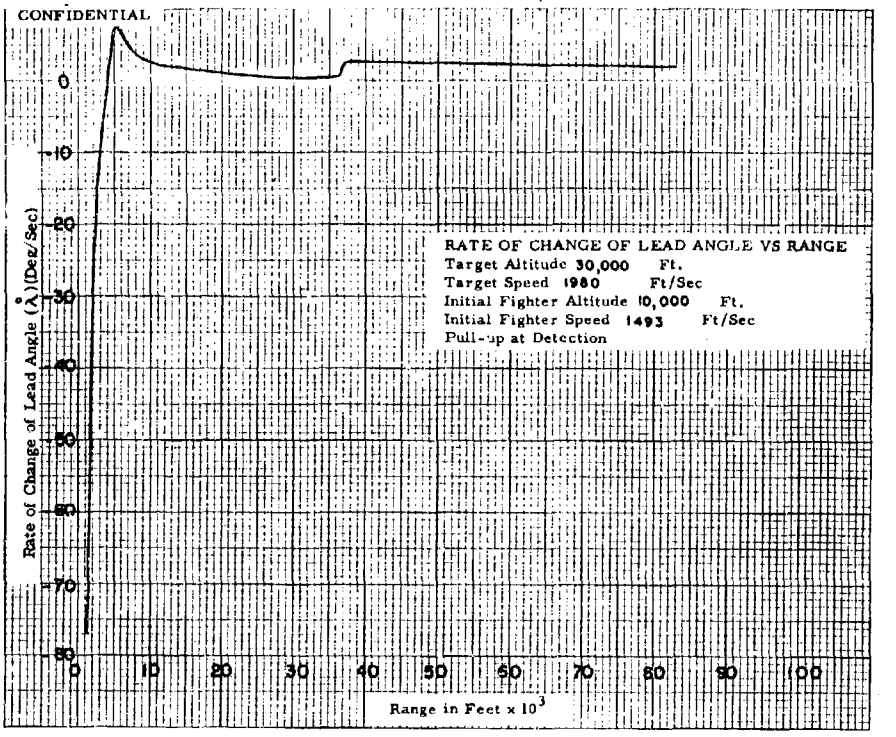

TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 5 Sec. After Detection
Total Lead Angle (λ)(°)
Range in Feet x 10³

Figure 656


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
0
-10
-20
-30
-40
-50
-60
-70
-80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

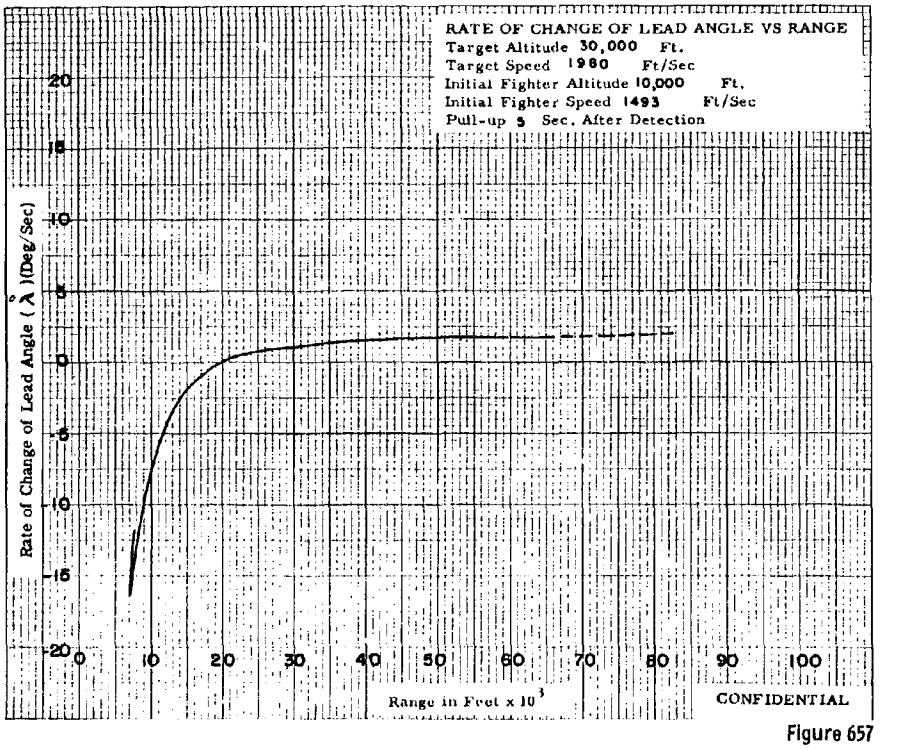
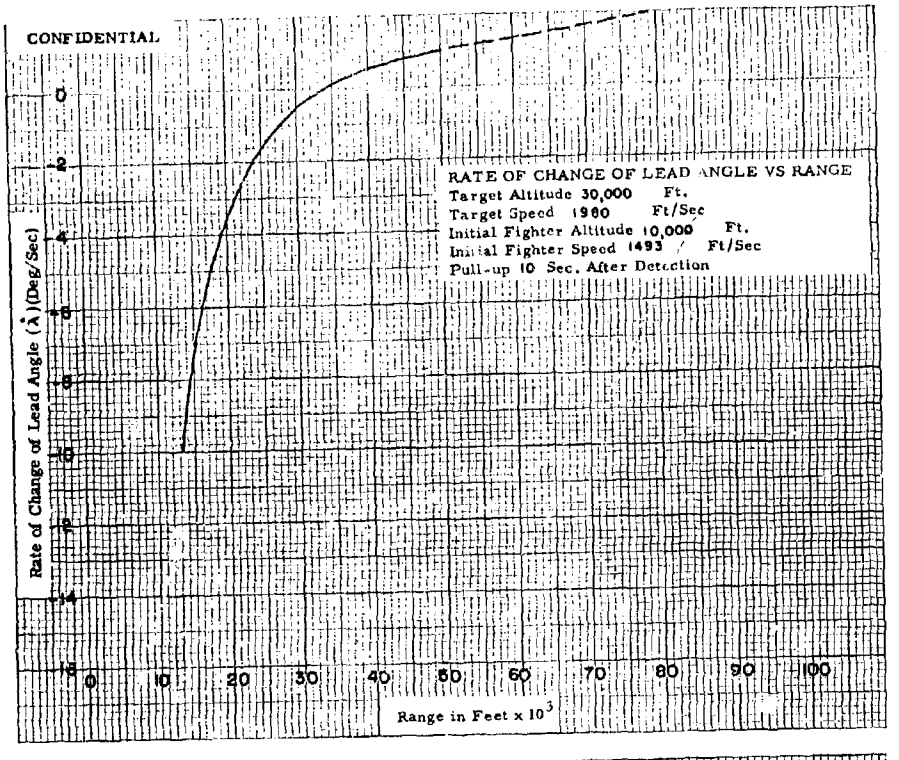
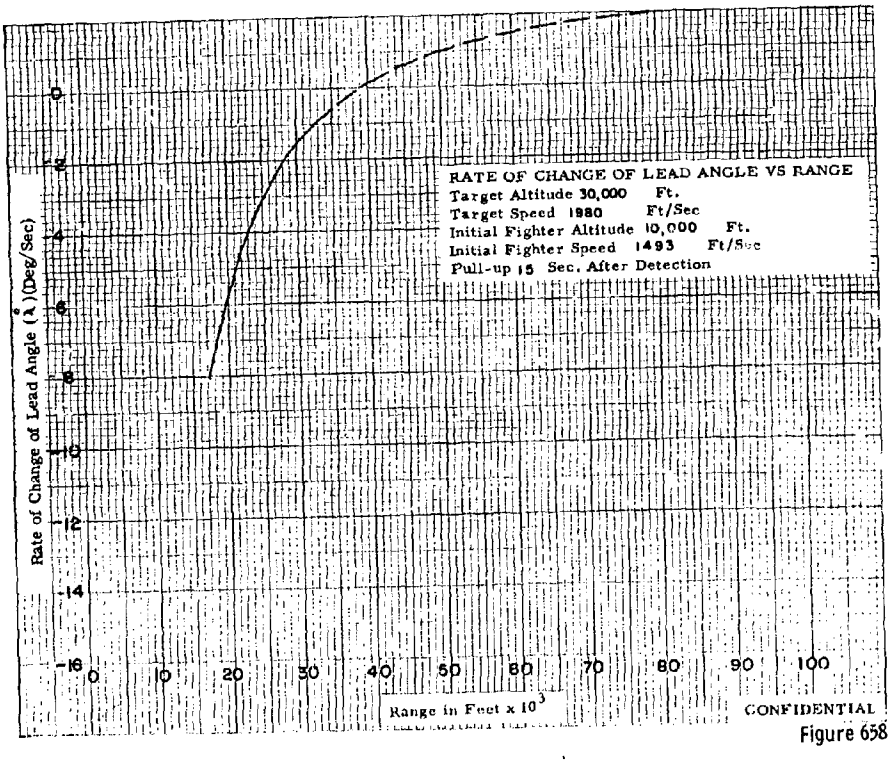

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 5 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
20
15
10
5
0
-5
-10
-15
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 657

CONFIDENTIAL

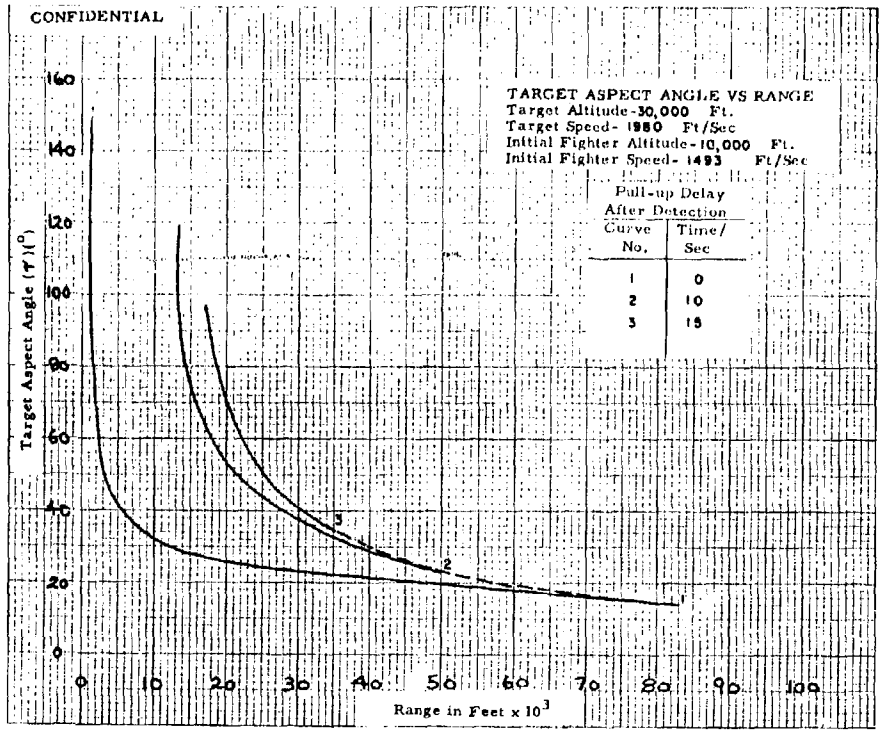


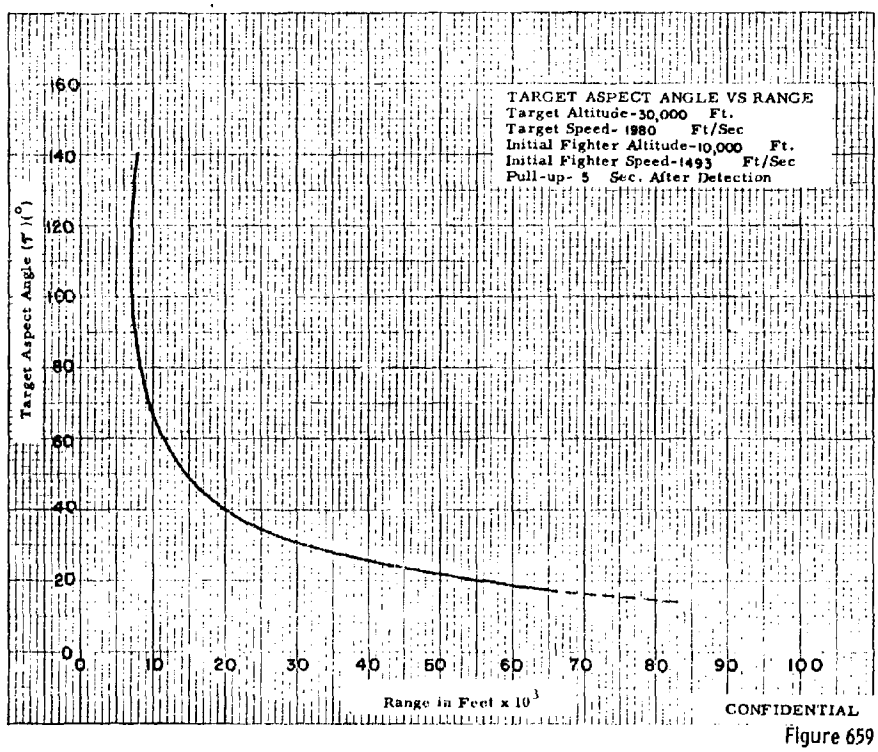


CONFIDENTIAL

Figure 658

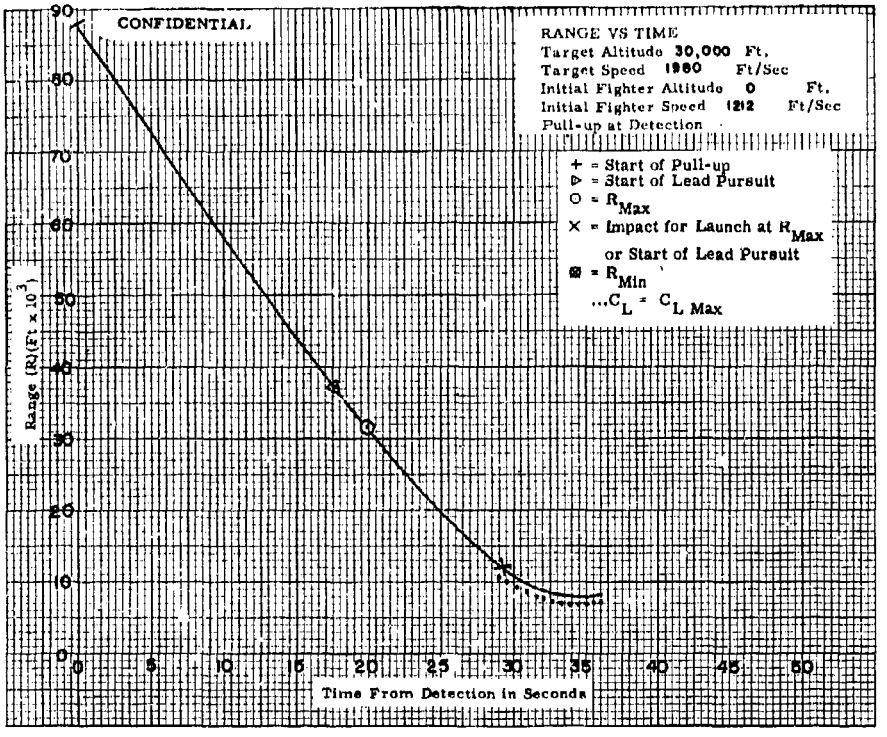
CONFIDENTIAL





CONFIDENTIAL

Figure 659


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

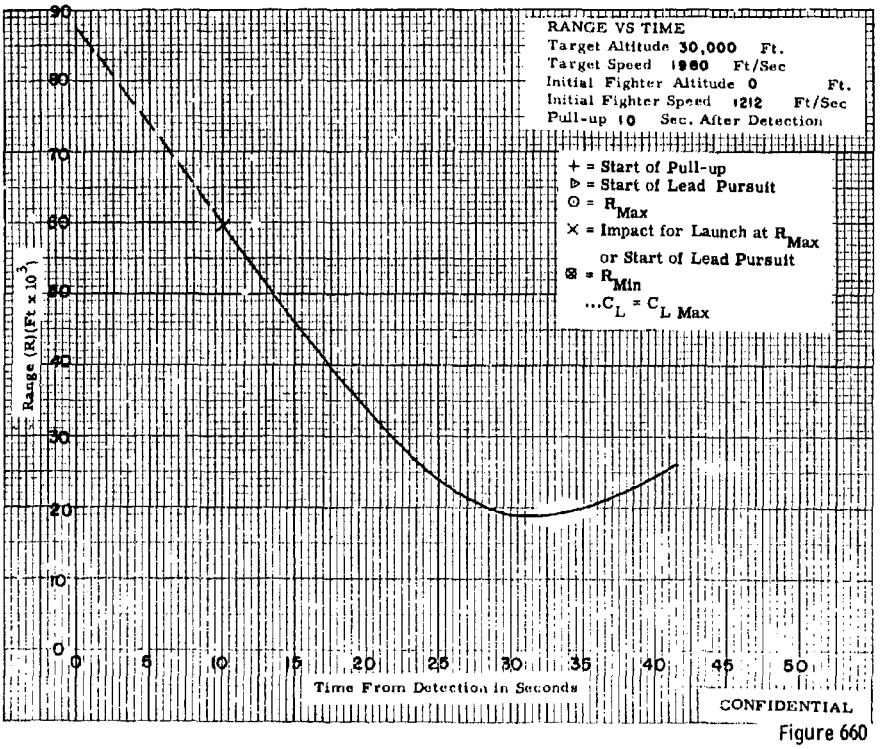

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 660

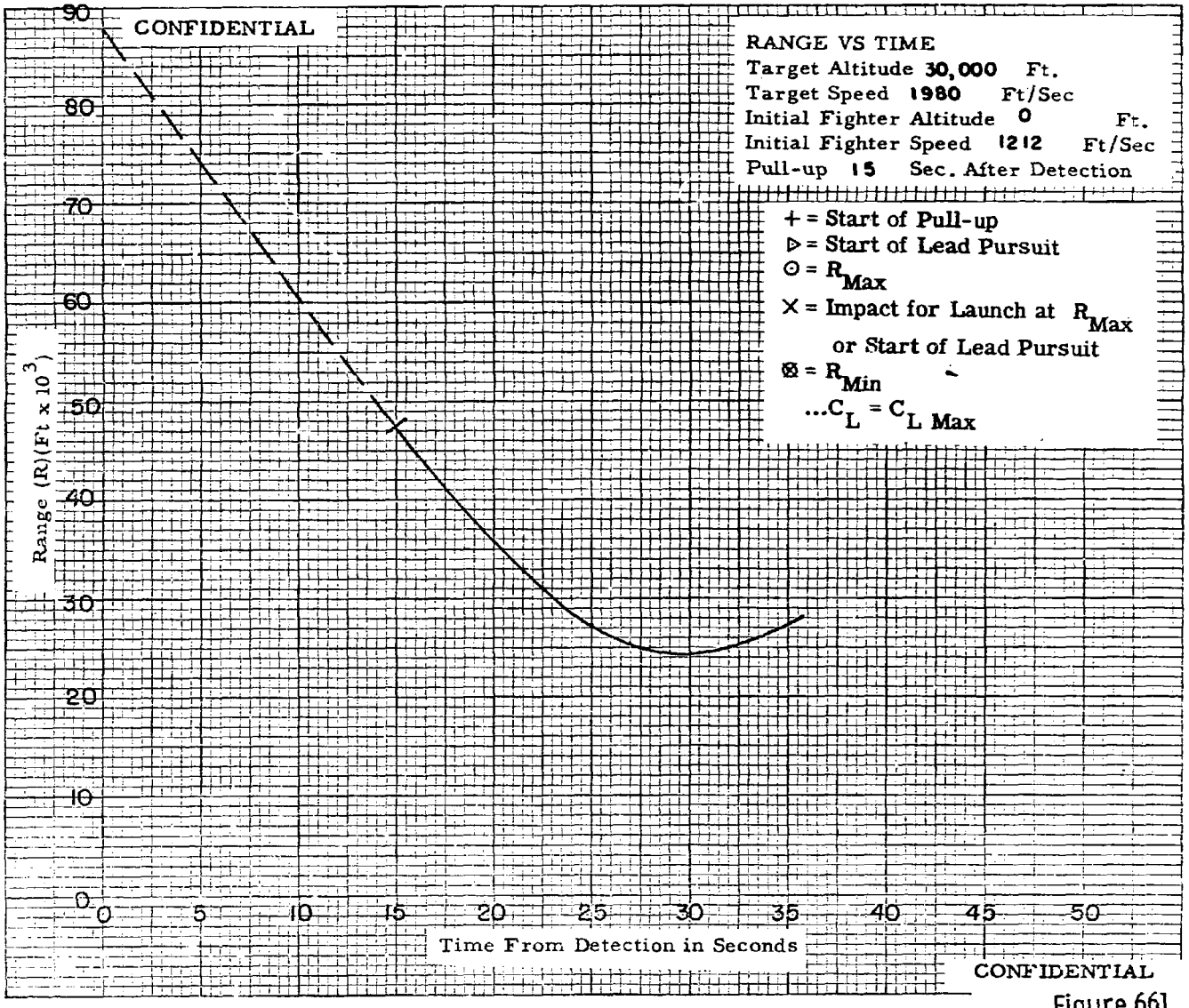
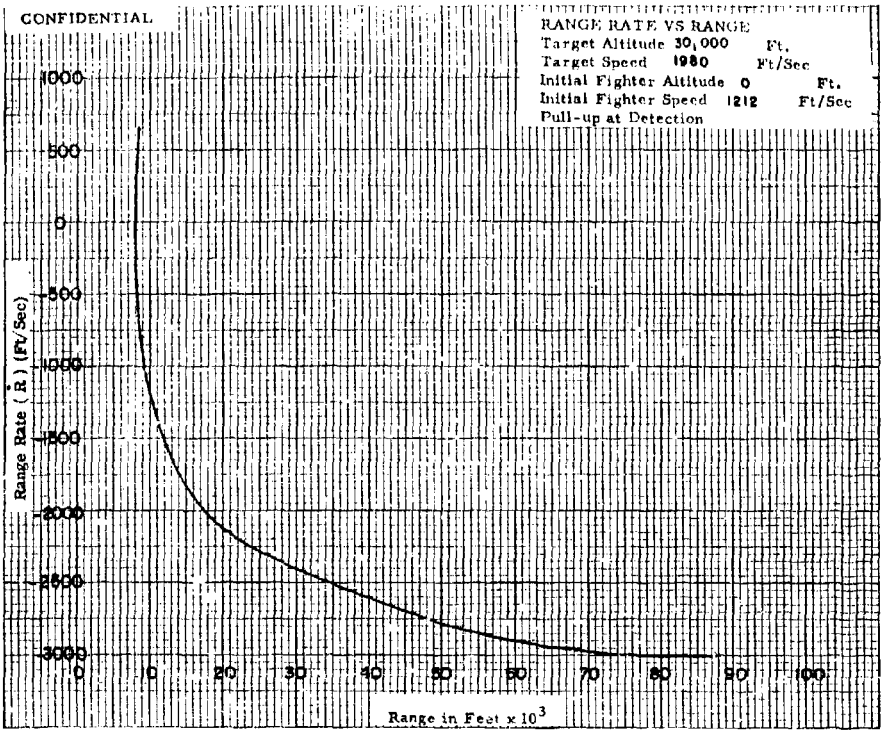

CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
CONFIDENTIAL

Figure 661


RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

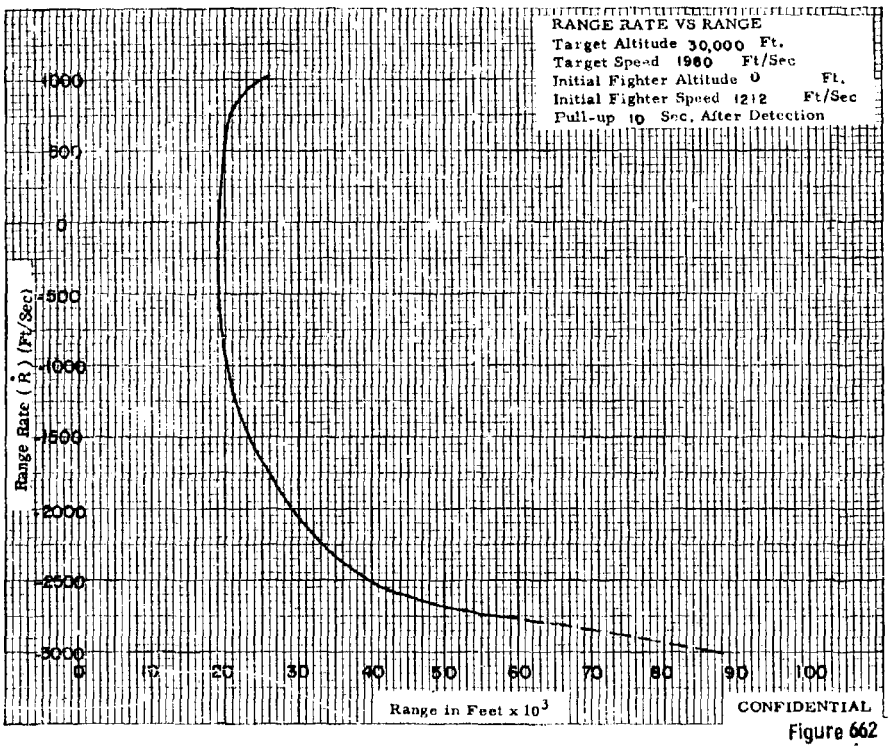

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 662

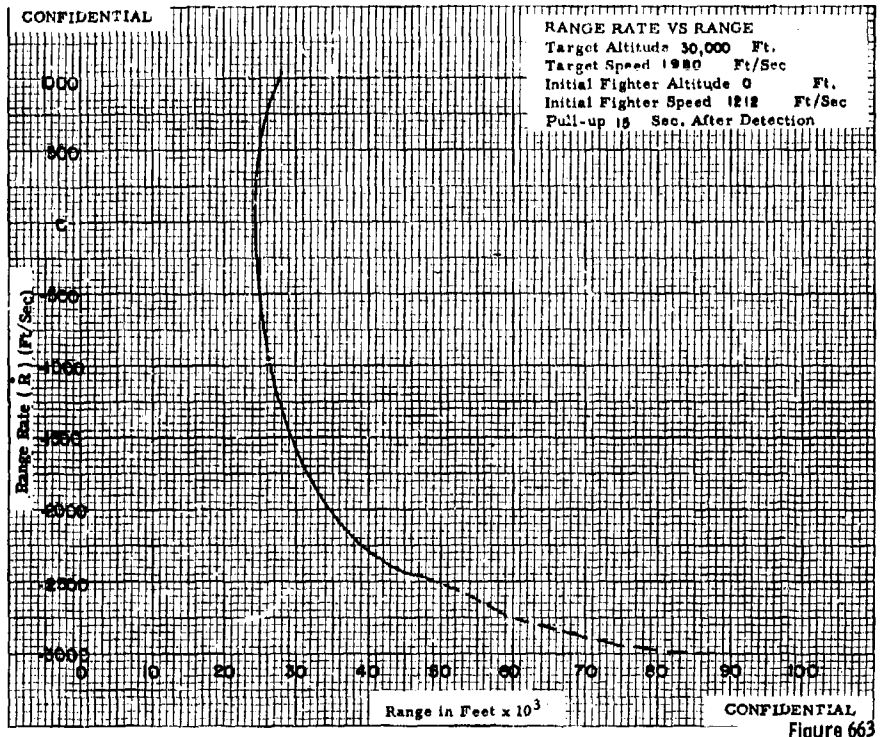


Figure 663

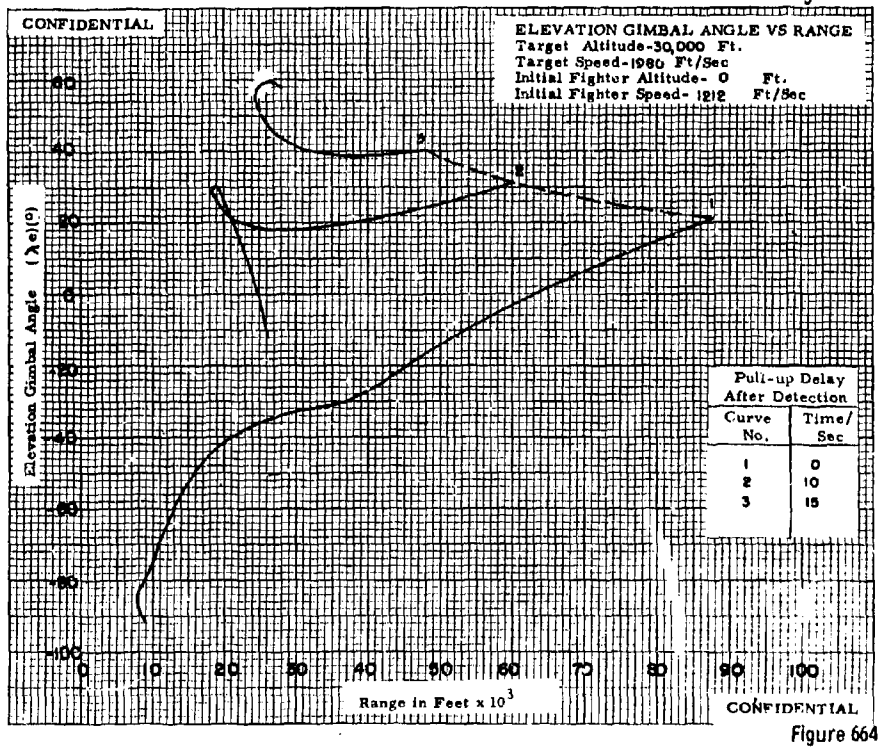
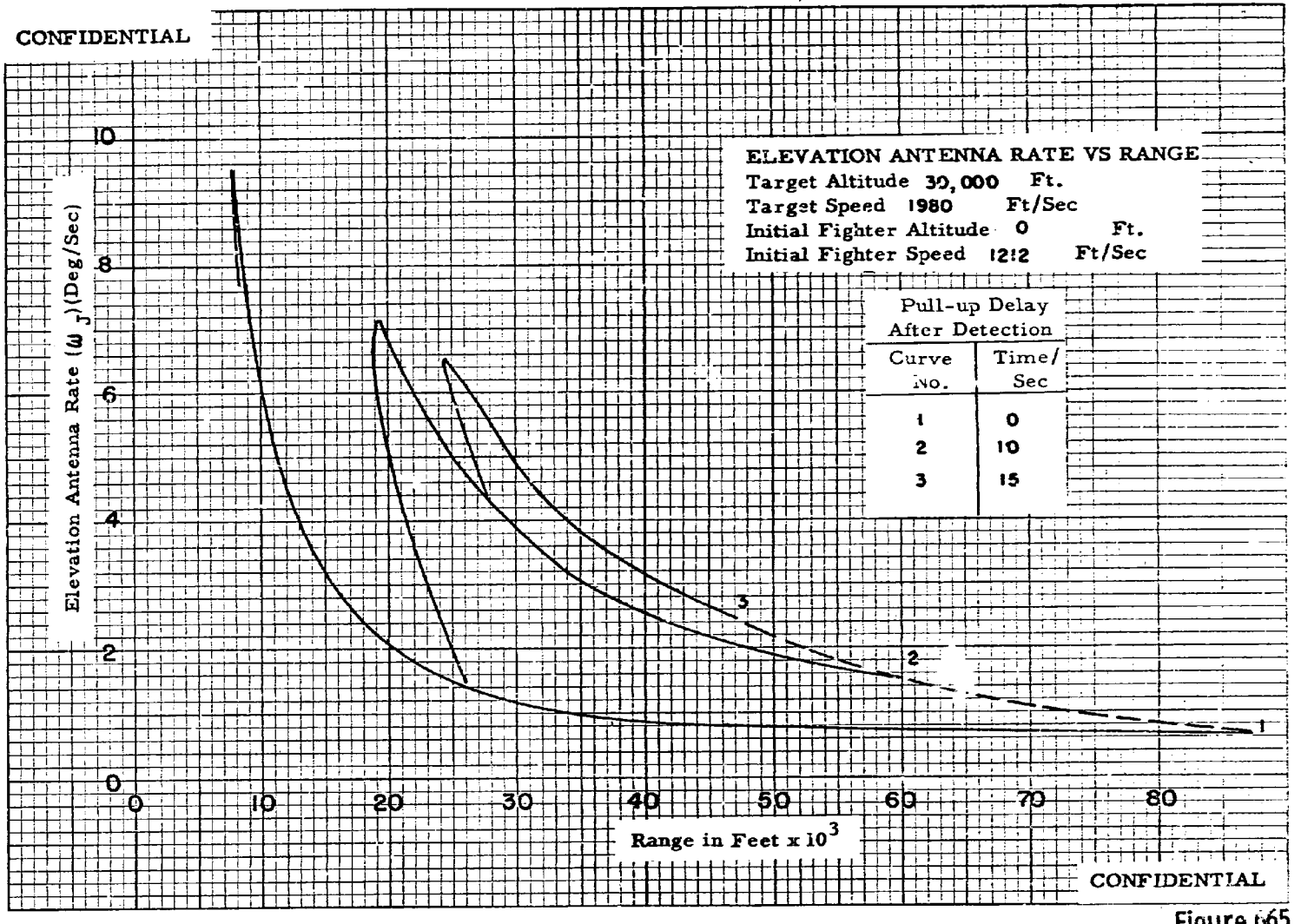


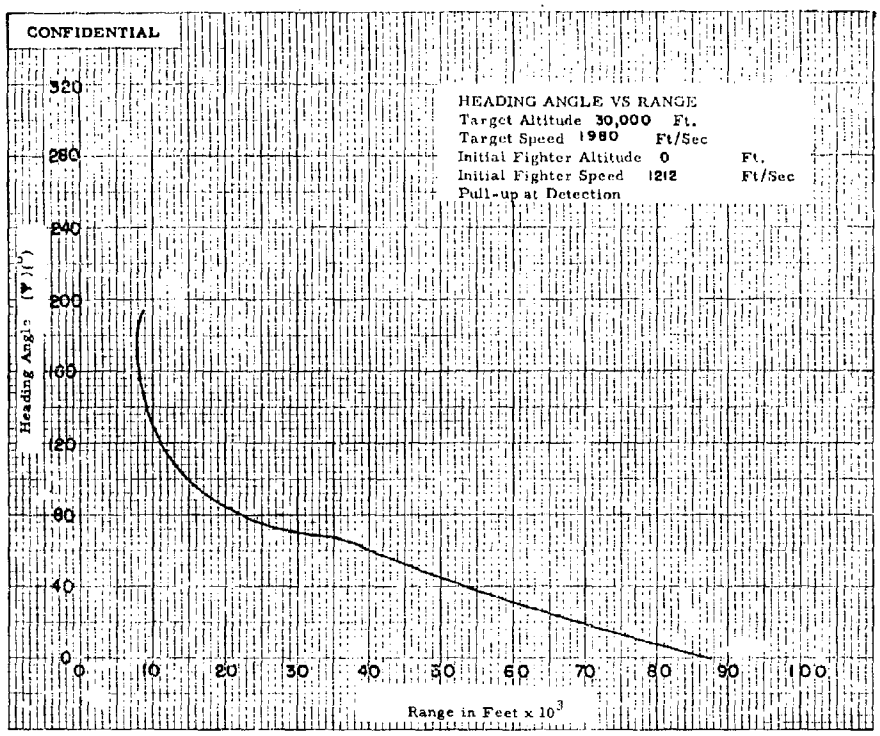
Figure 664

CONFIDENTIAL



CONFIDENTIAL

Figure 665


CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up at Detection
Heading Angle (Ψ)(°)
320
280
240
200
160
120
80
40
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10³

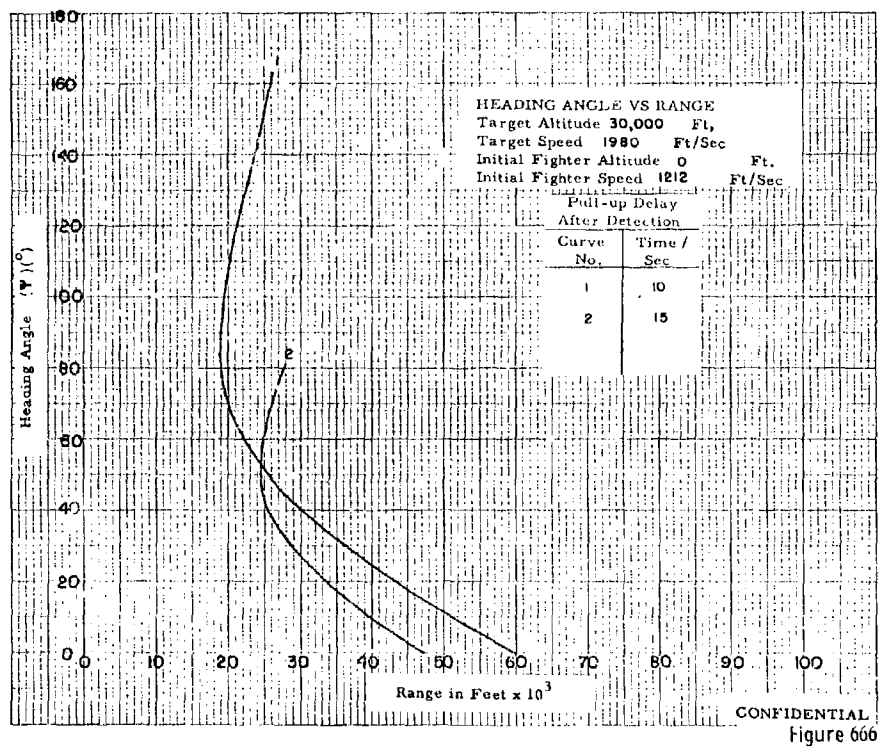
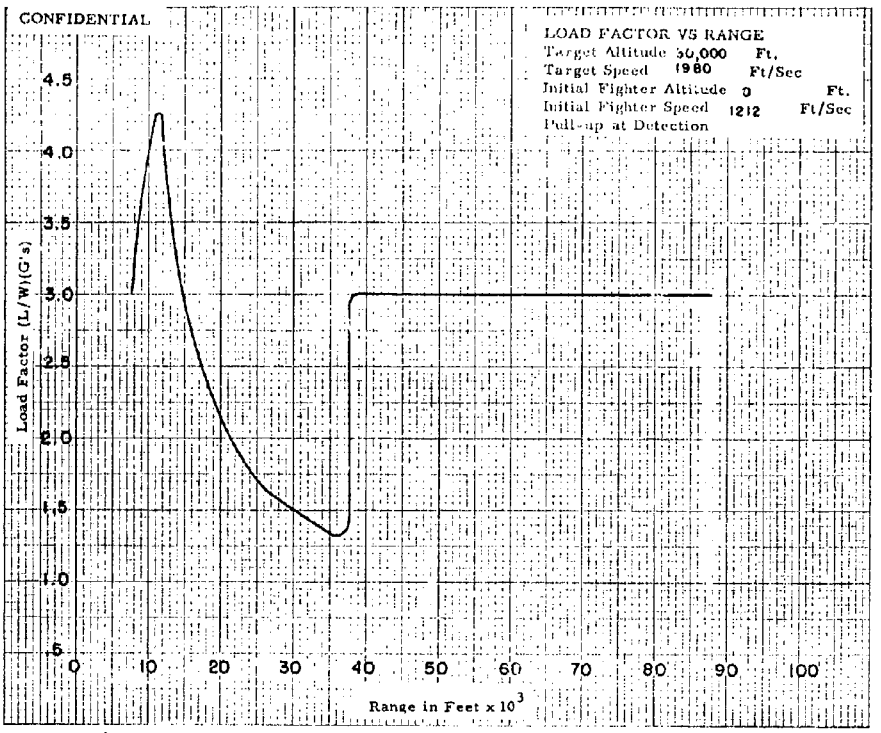

HEADING ANGLE VS RANGE
Target Altitude 30,000 Ft,
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time / Sec
1 | 10
2 | 15
Heading Angle (Ψ)(°)
160
140
120
100
80
60
40
20
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10³
CONFIDENTIAL

Figure 666


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

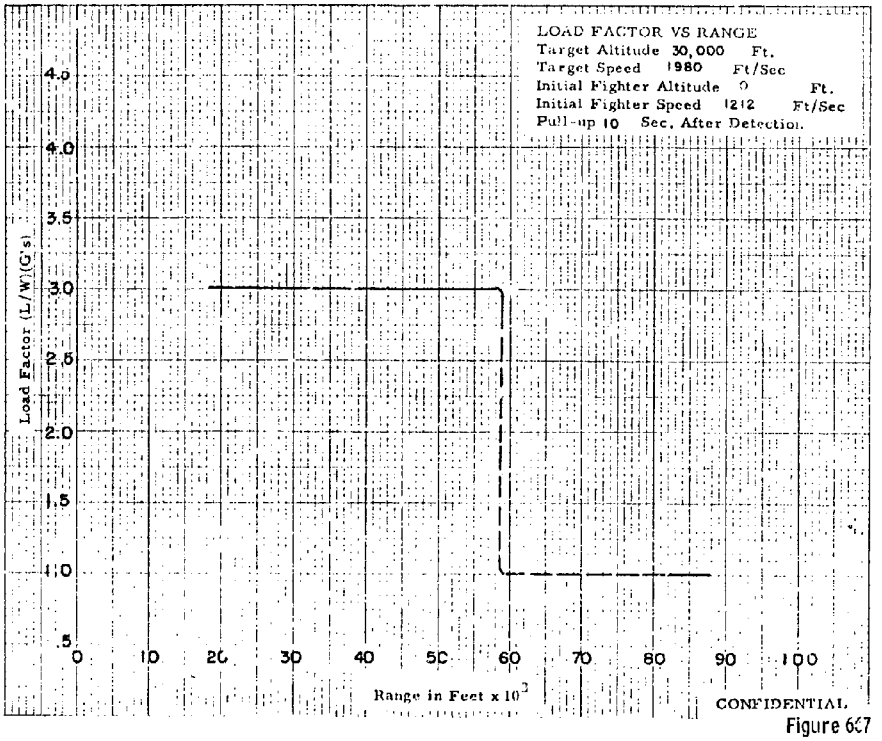

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 10 Sec. After Detection.
Load Factor (L/W)(G's)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^2
CONFIDENTIAL

Figure 647

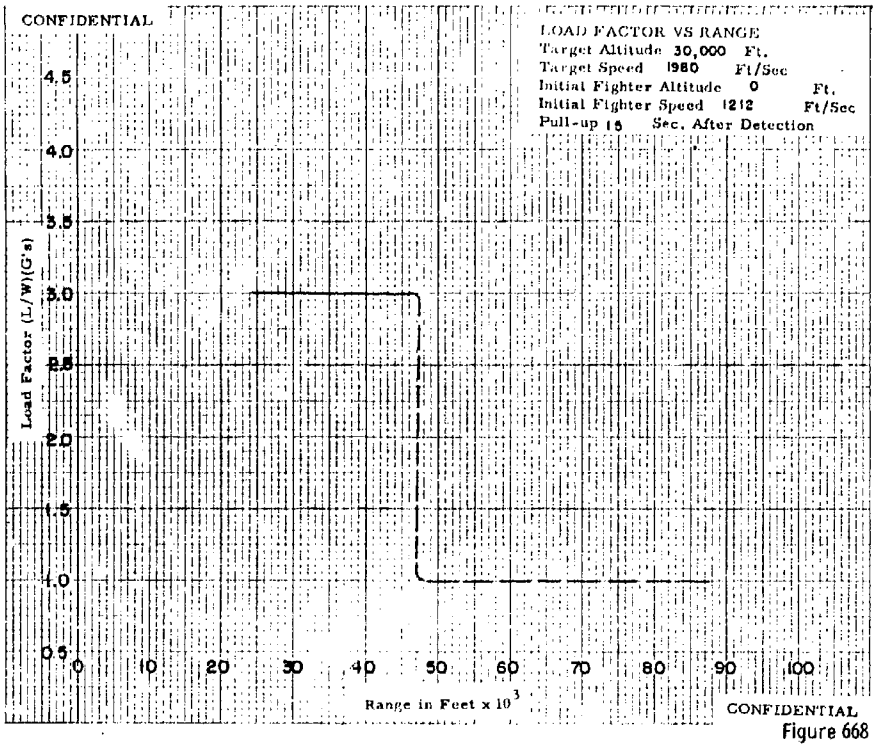


Figure 668

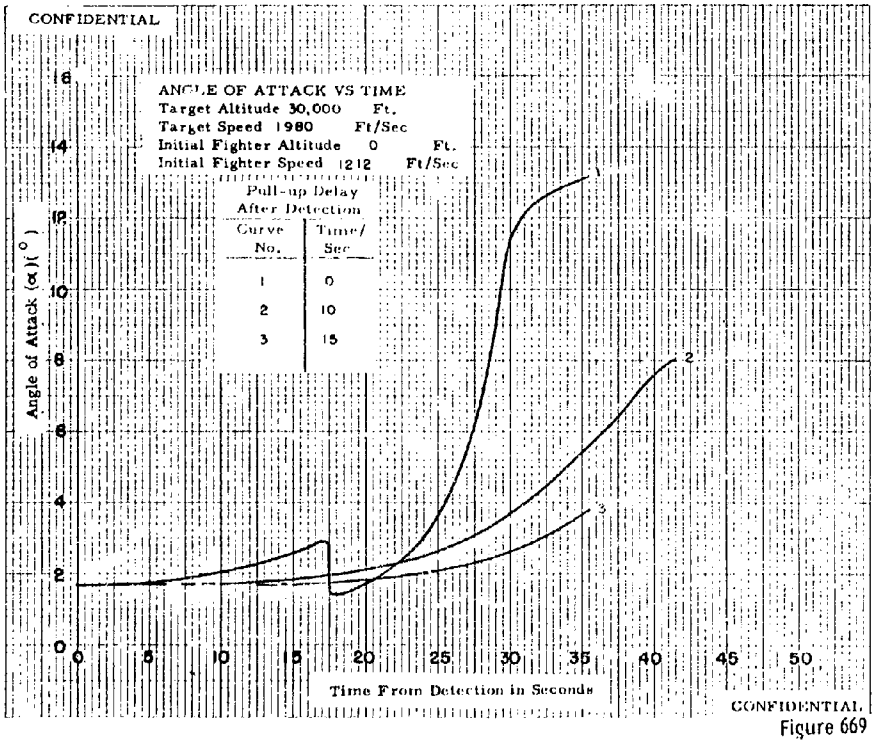


Figure 669

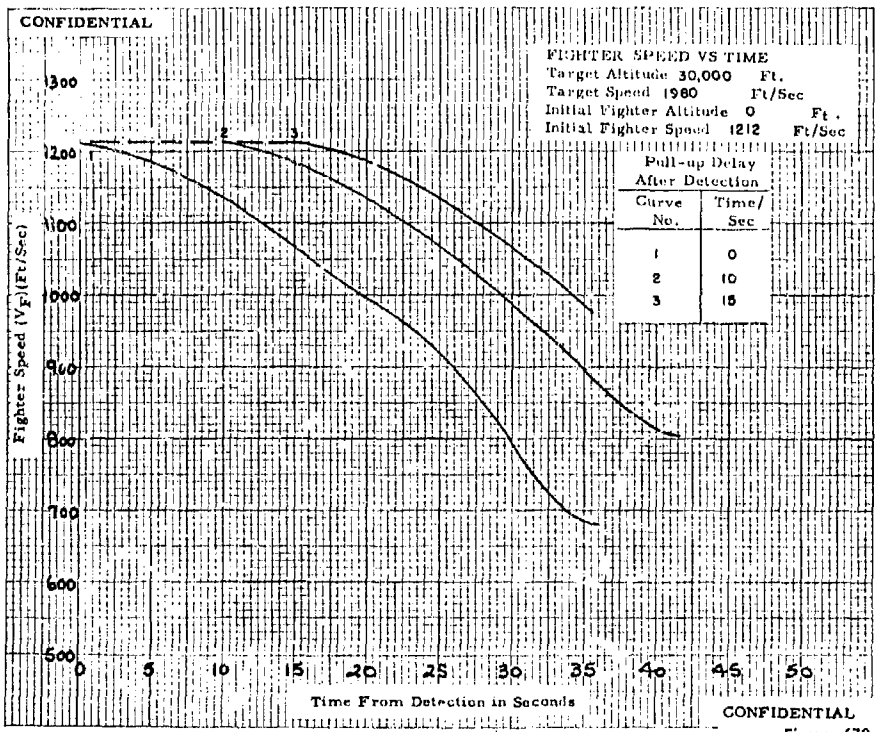


Figure 670

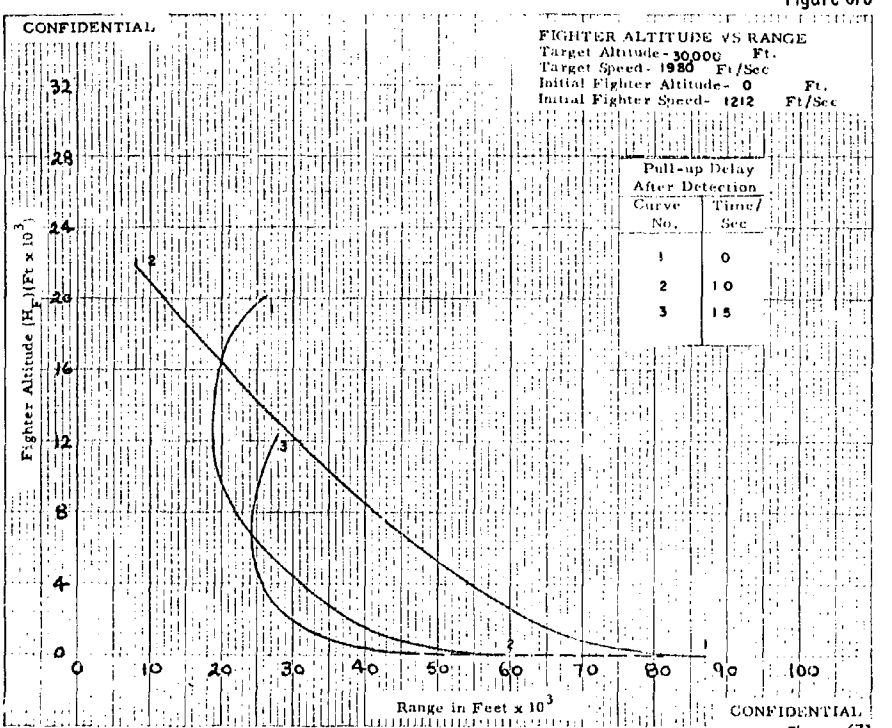
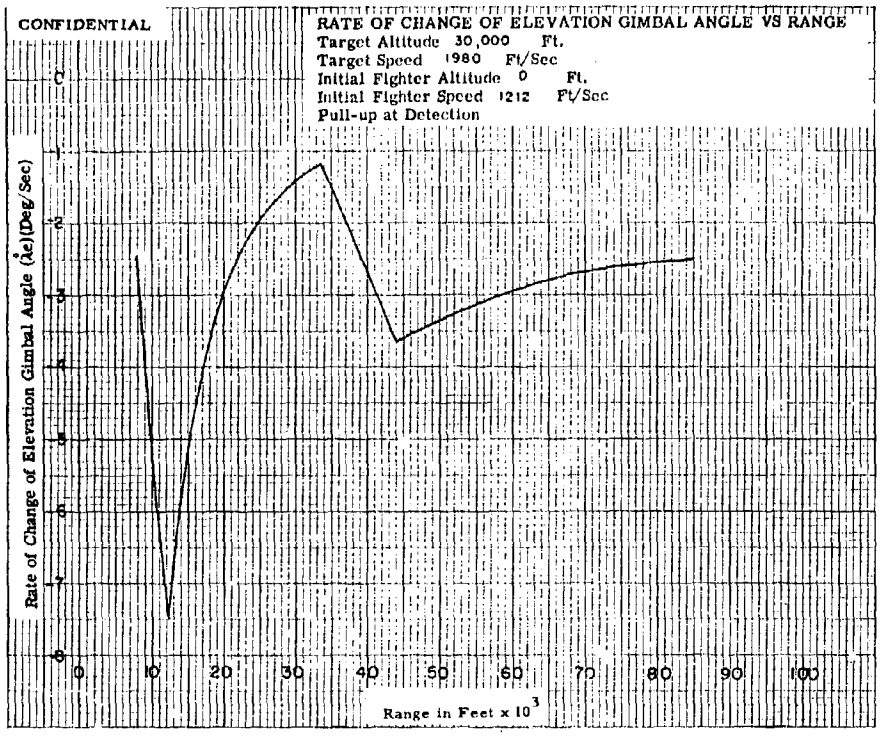
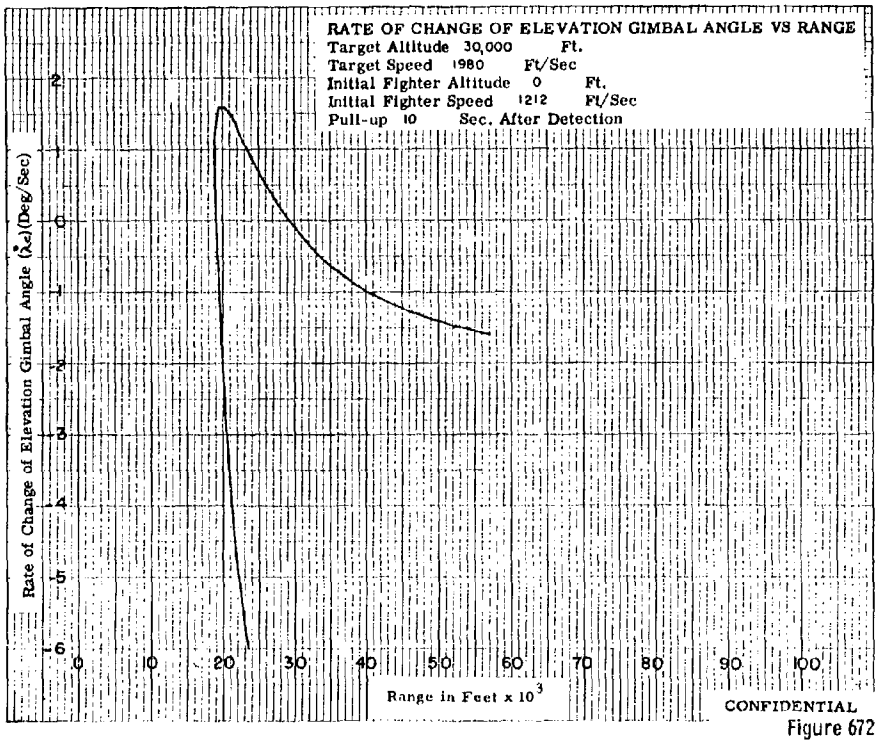


Figure 671

CONFIDENTIAL





CONFIDENTIAL

Figure 672

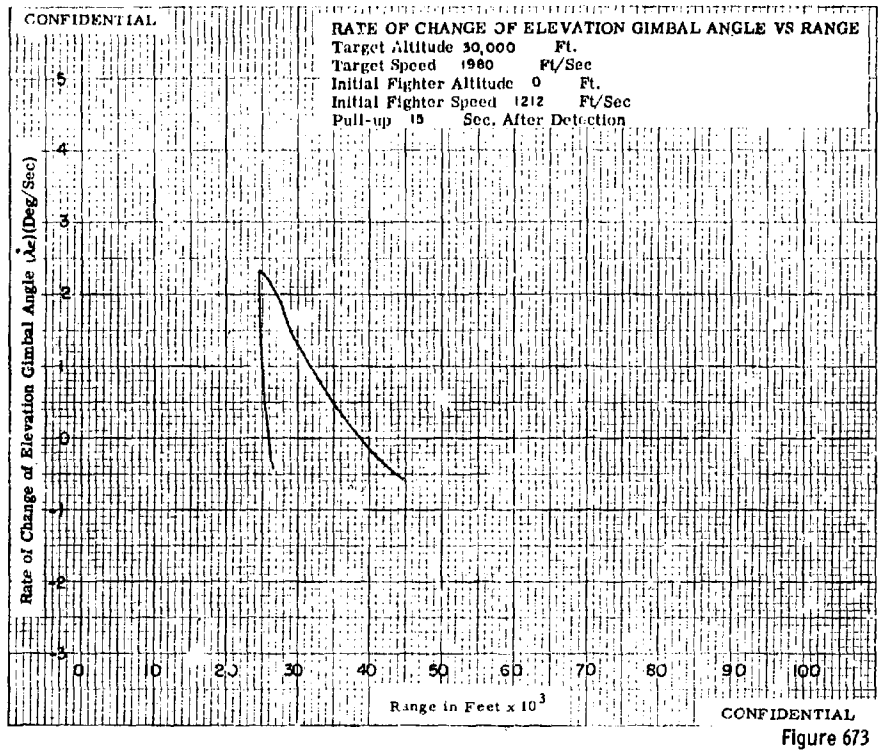


Figure 673

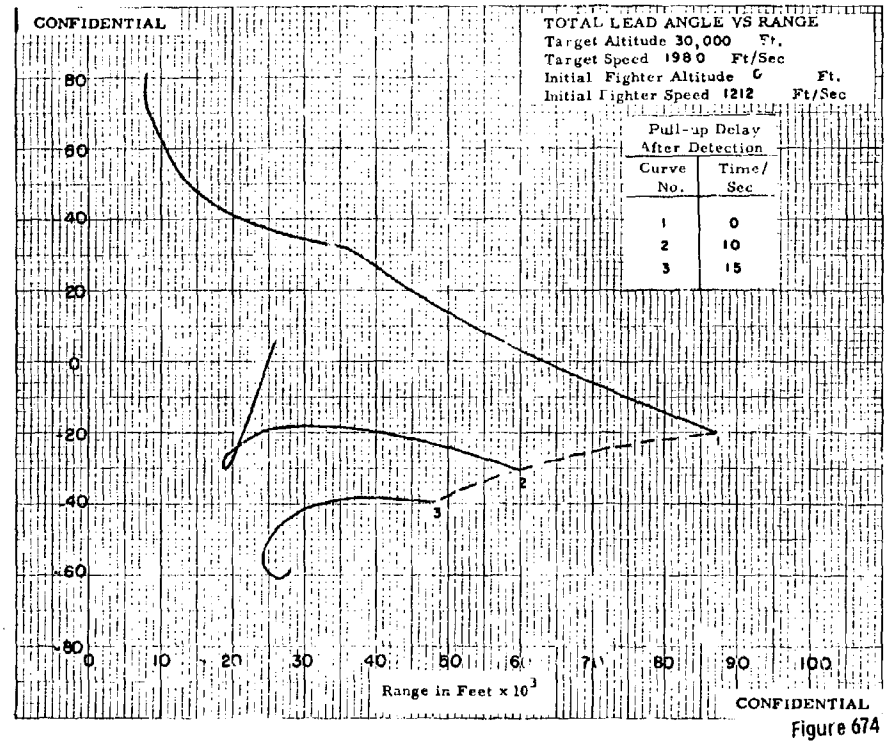
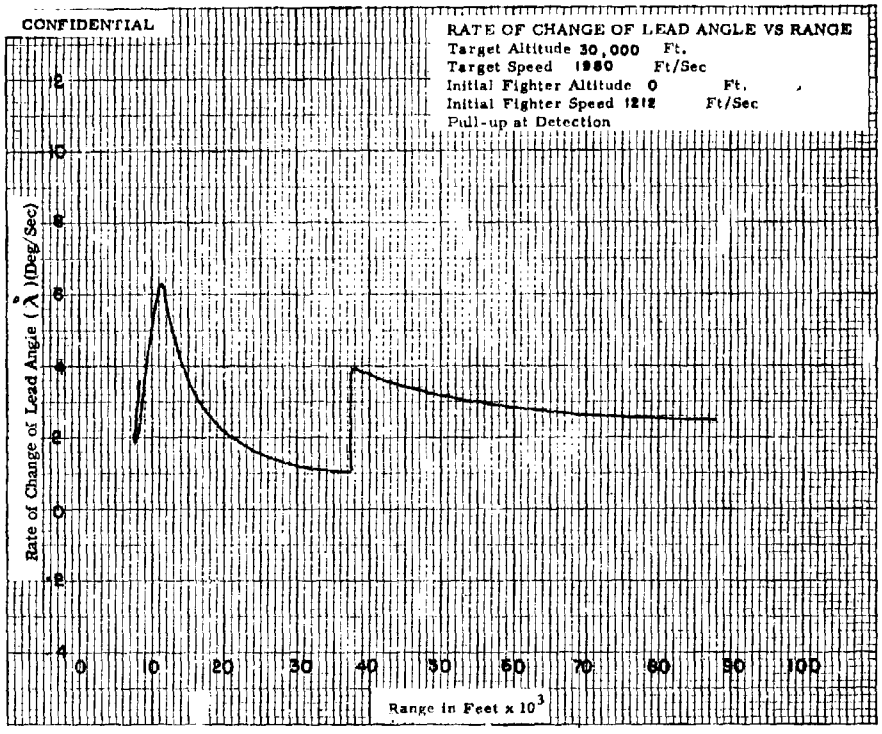


Figure 674


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
Range in Feet x 10³

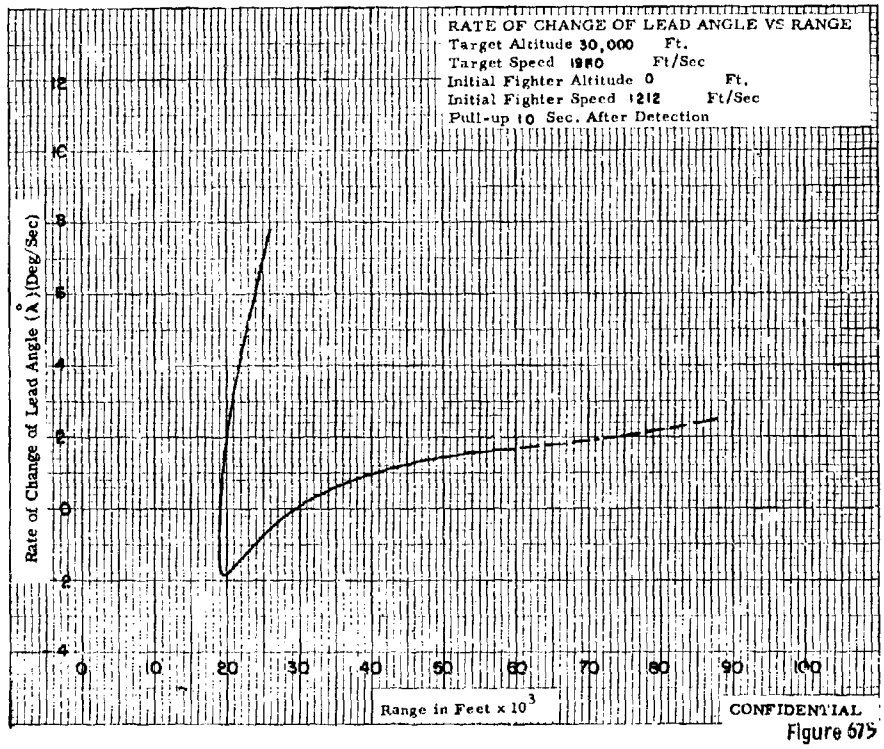

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
Range in Feet x 10³

Figure 675

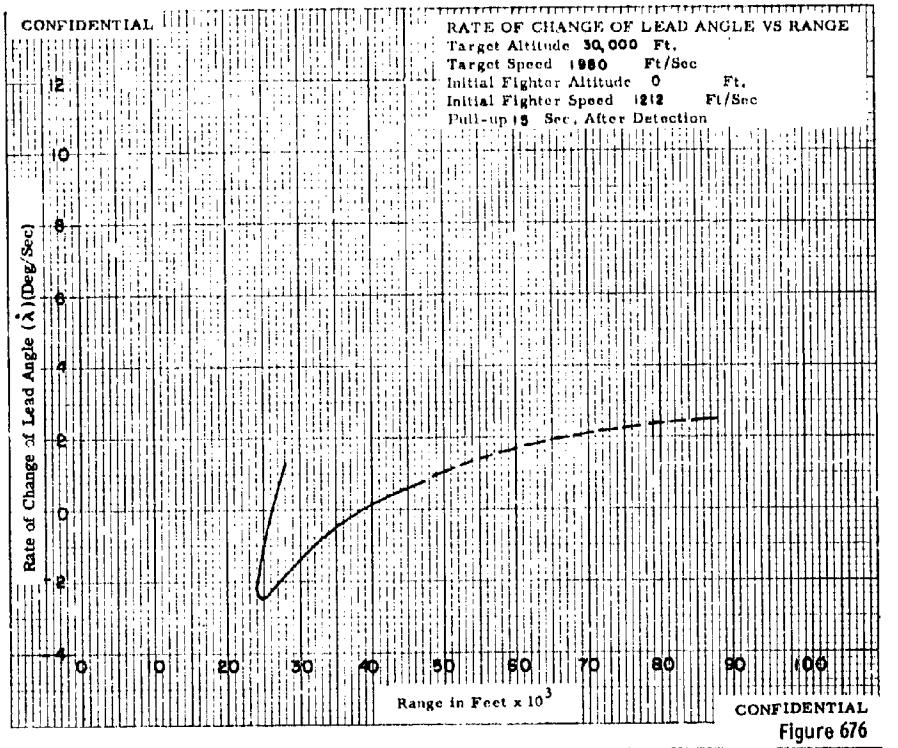


Figure 676

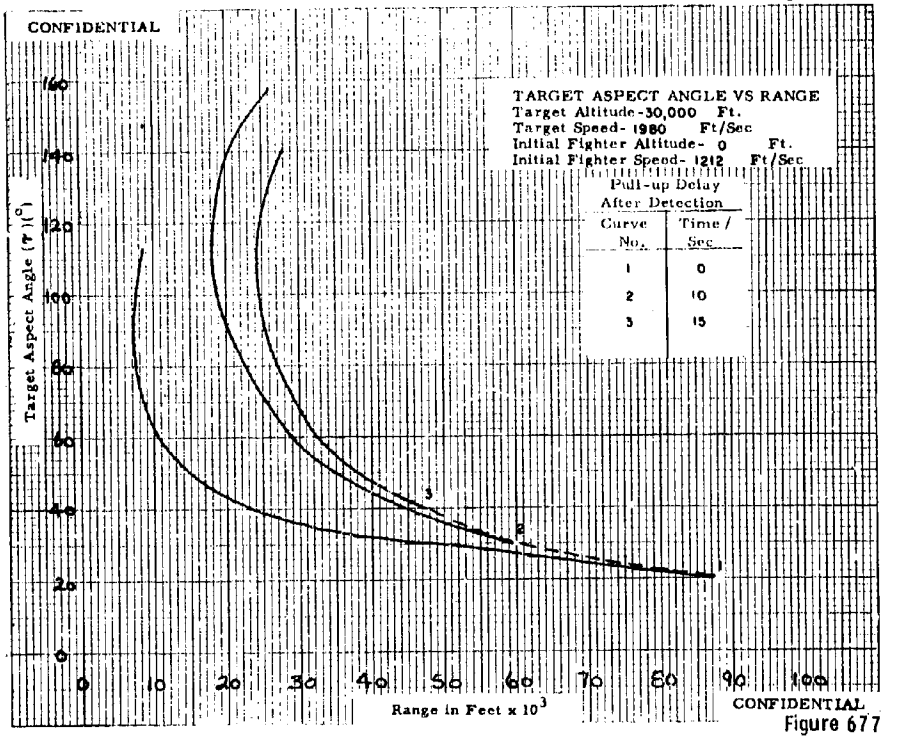
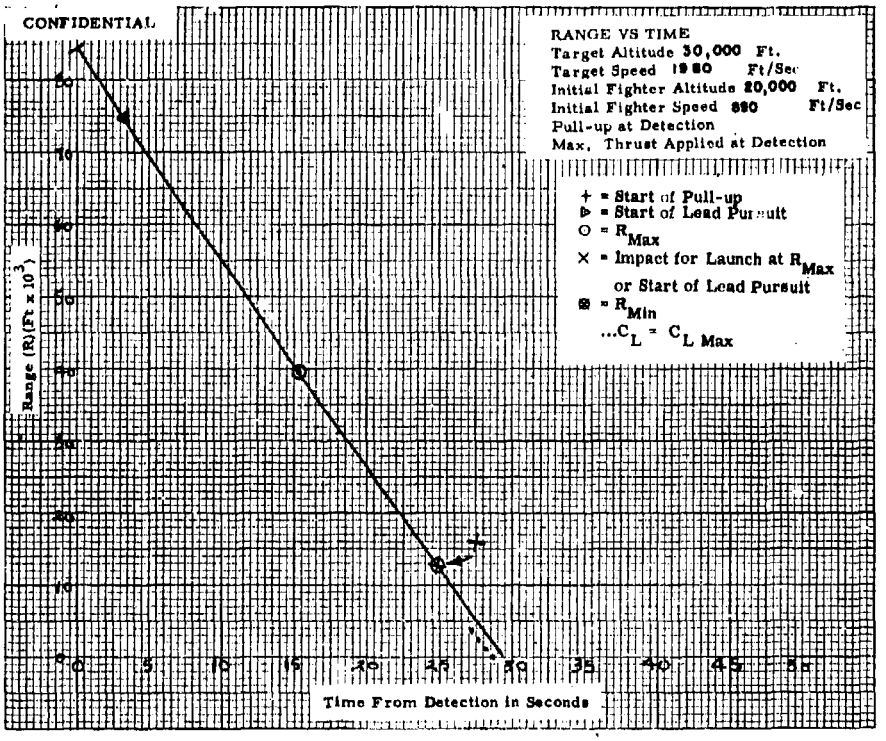


Figure 677


RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊠ = R Min ...C L = C L Max
Range (R) (Ft x 10 3)
Time From Detection in Seconds

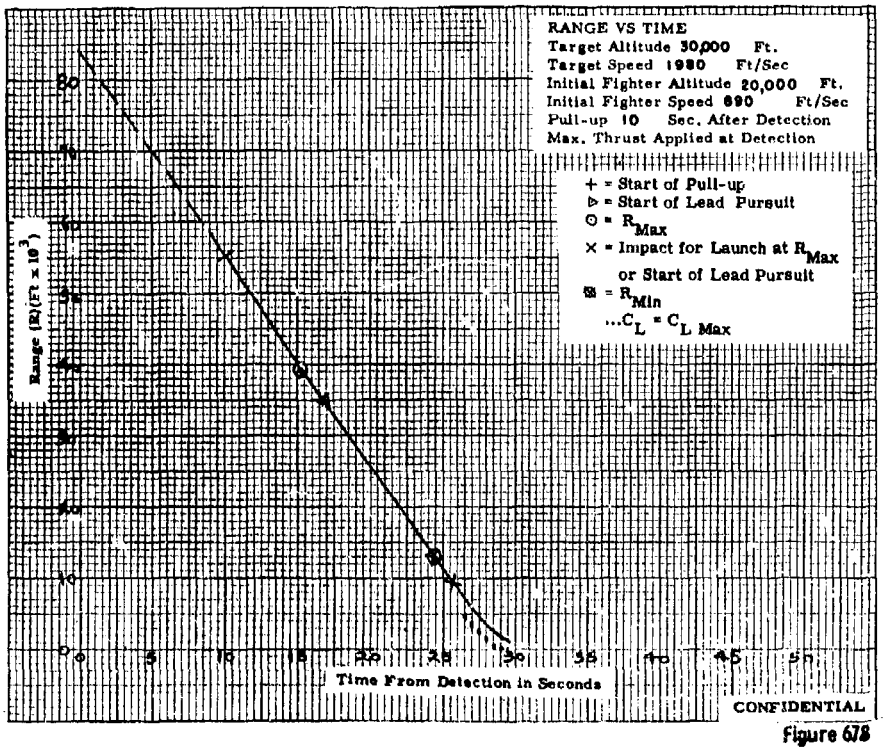
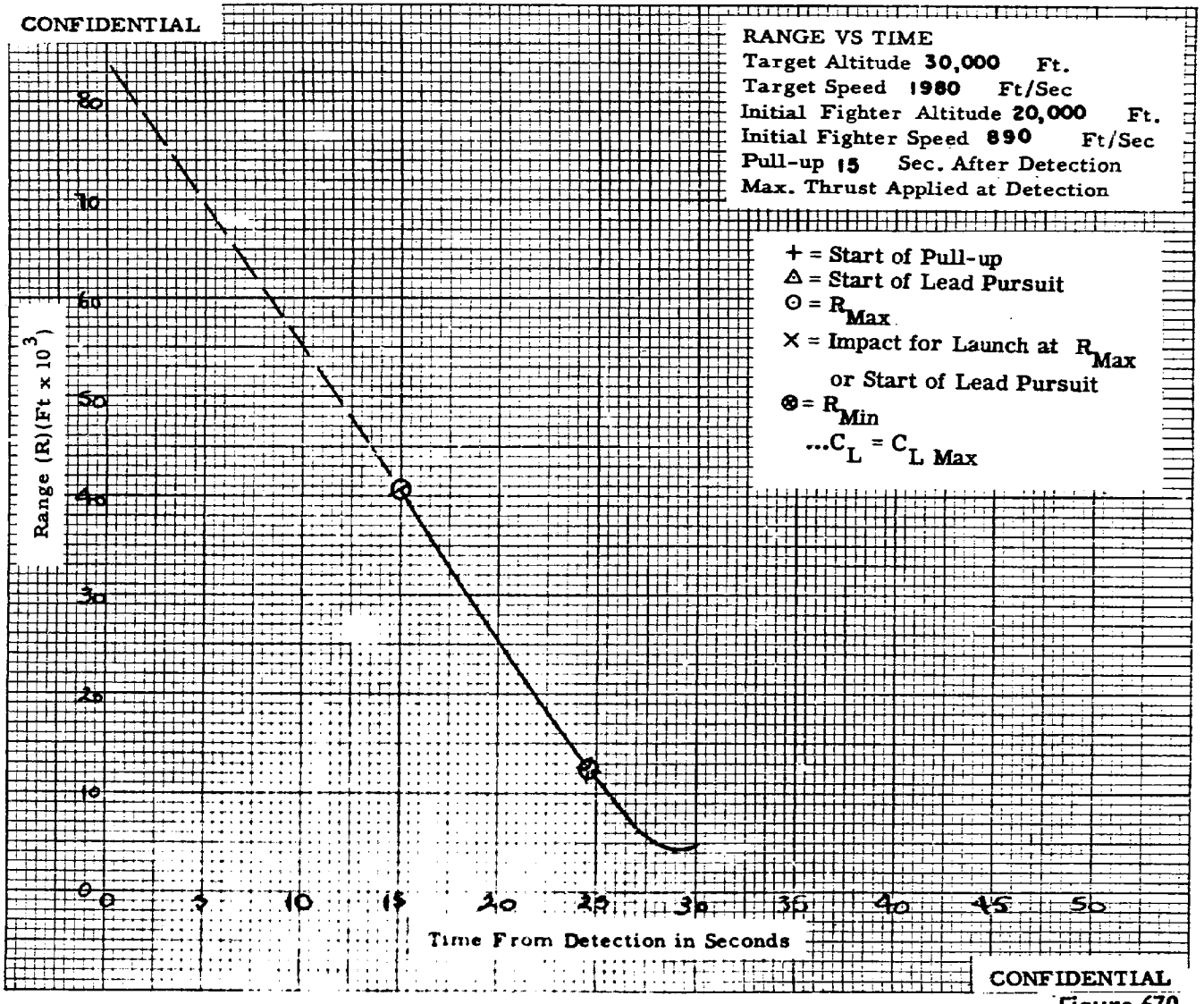

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
O = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊠ = R Min ...C L = C L Max
Range (R) (Ft x 10 3)
Time From Detection in Seconds

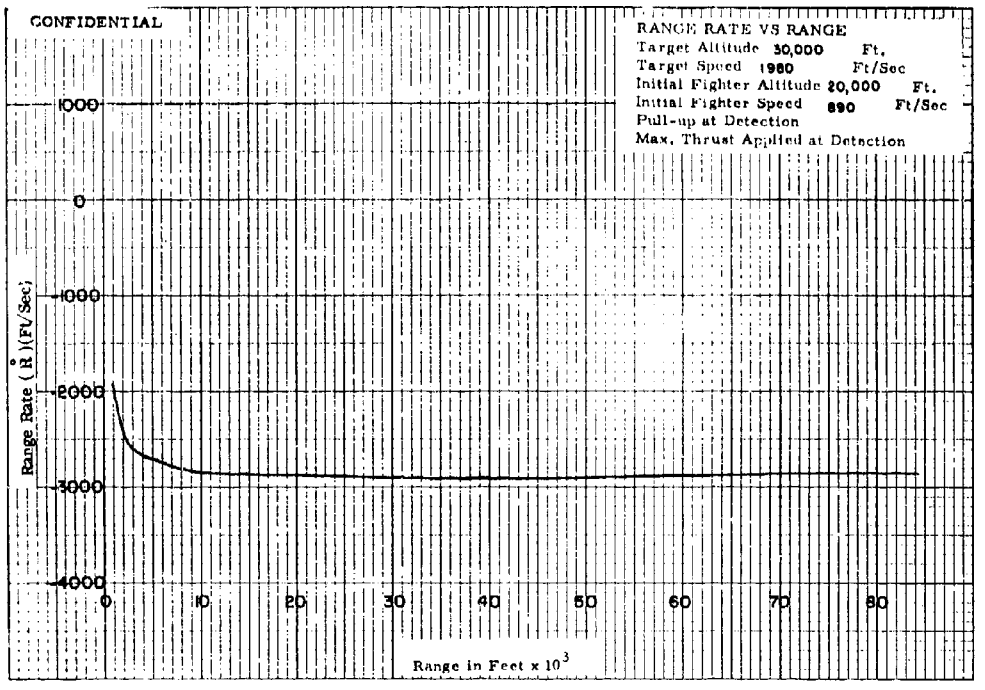
Figure 678

CONFIDENTIAL



CONFIDENTIAL

Figure 679


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
1000
0
-1000
-2000
-3000
-4000
Range Rate (Ṙ)(Ft/Sec)
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

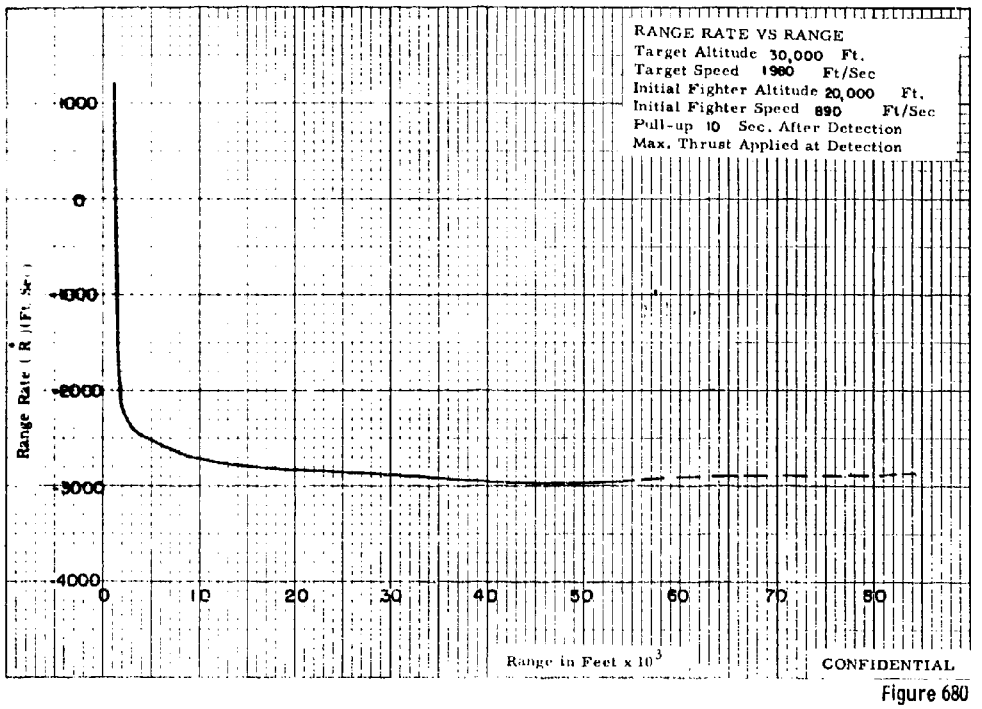

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
1000
0
-1000
-2000
-3000
-4000
Range Rate (Ṙ)(Ft/Sec)
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 680

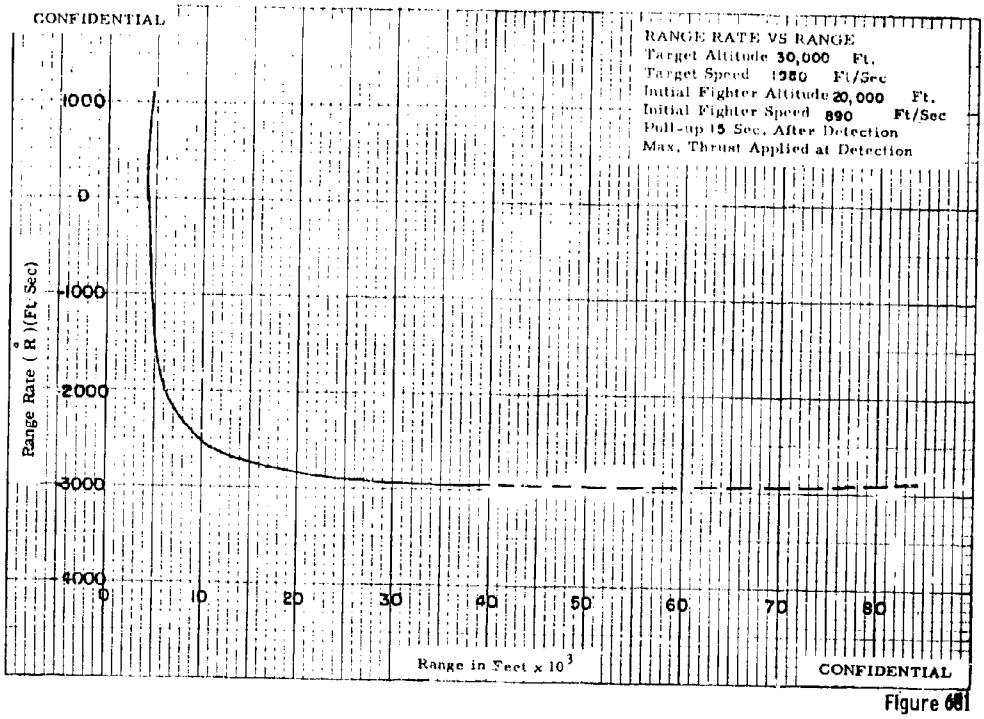


Figure 681

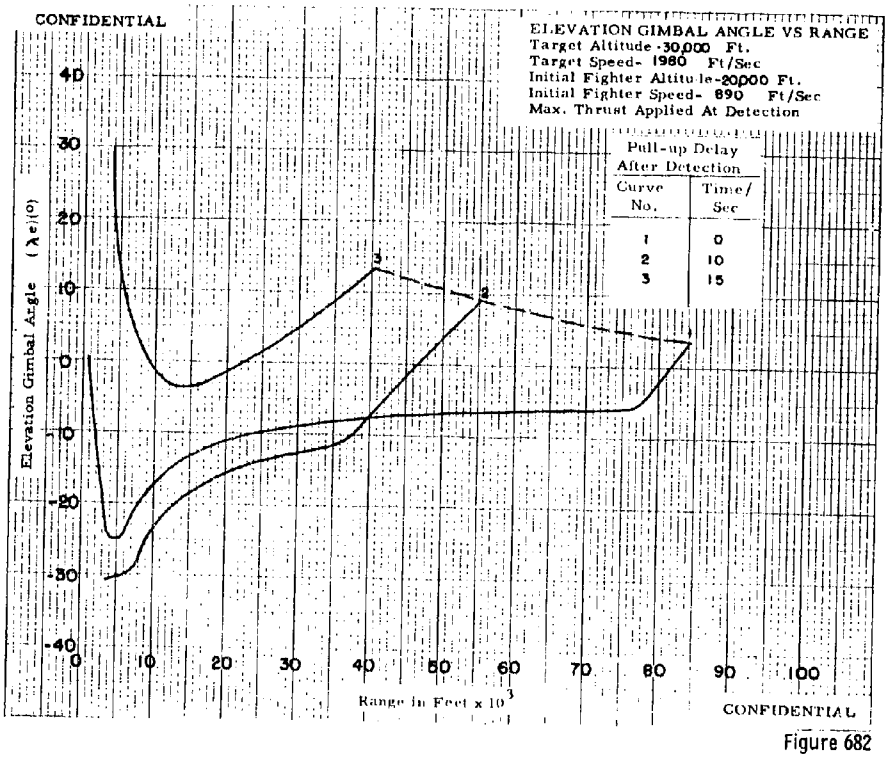
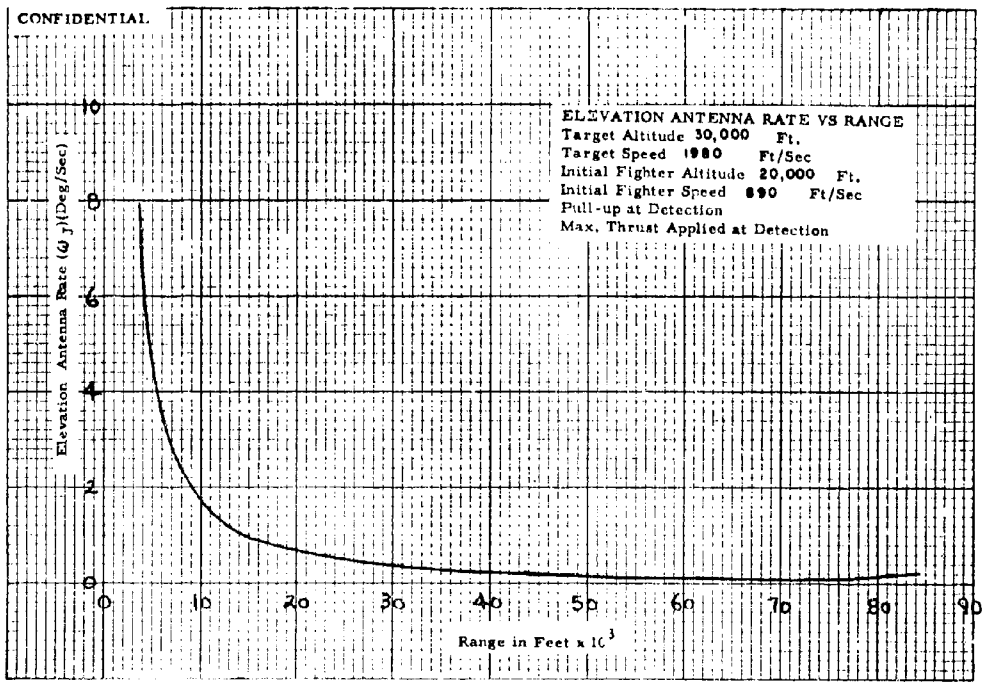


Figure 682


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω y)(Deg/Sec)
Range in Feet x 10^3

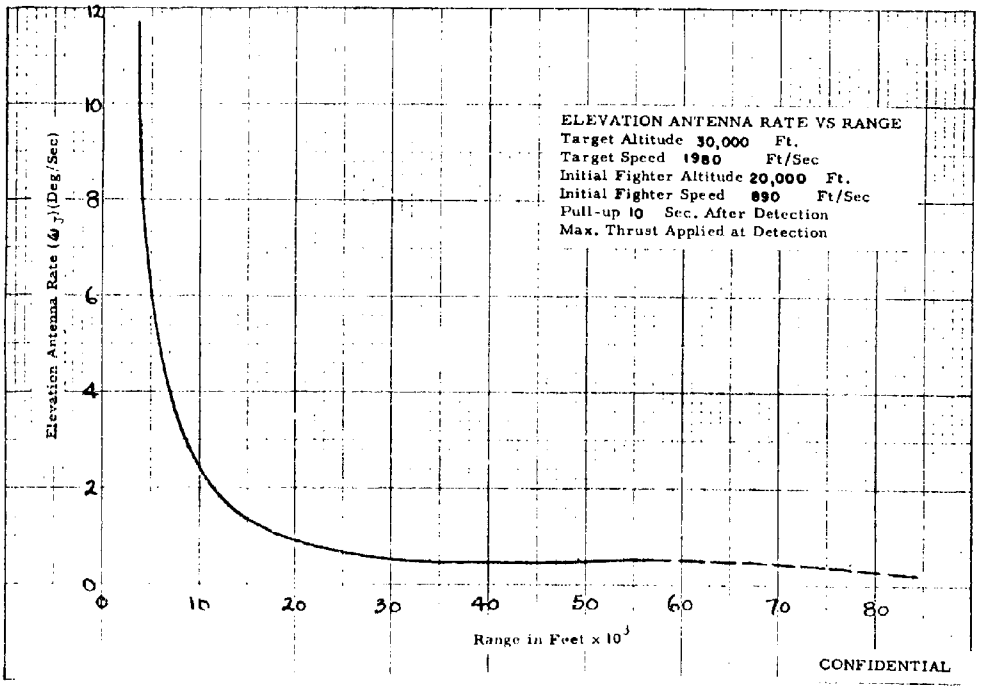

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω y)(Deg/Sec)
Range in Feet x 10^3

Figure 683

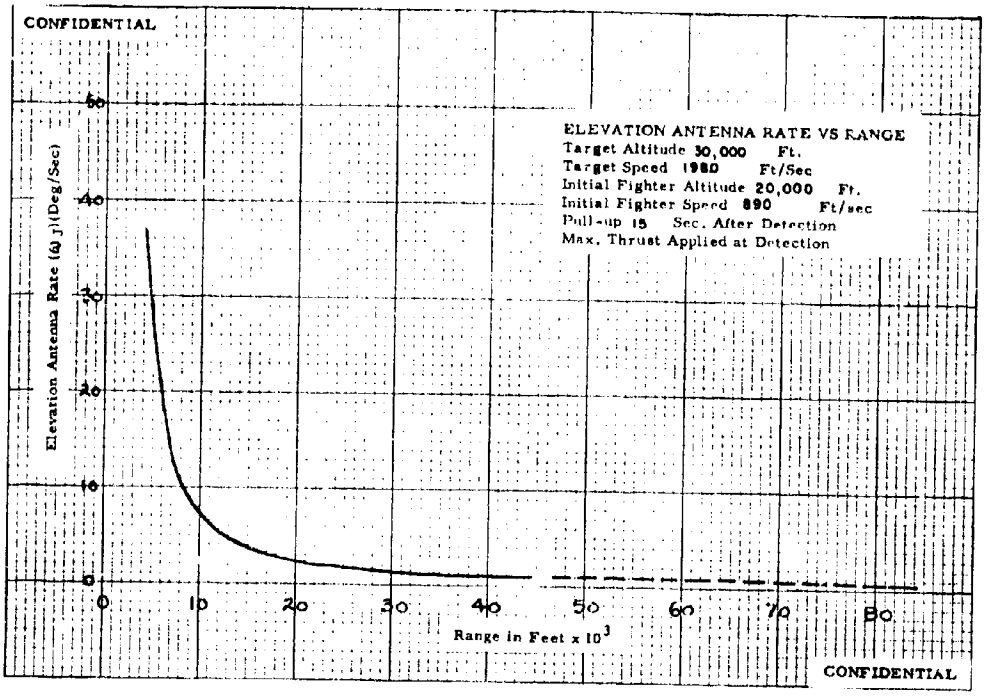


Figure 684

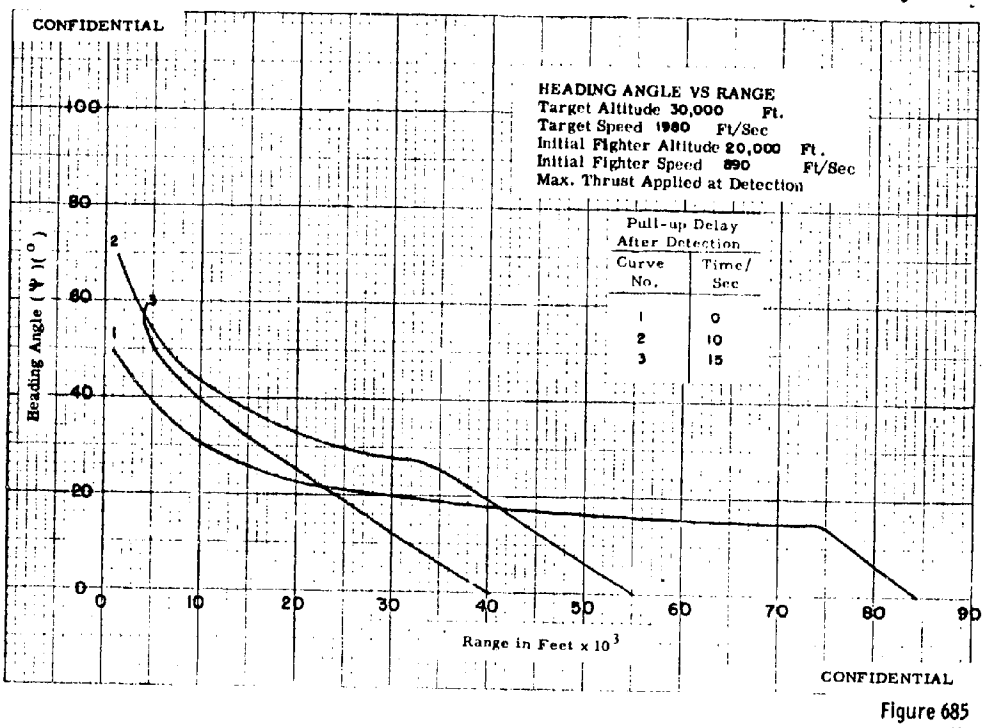
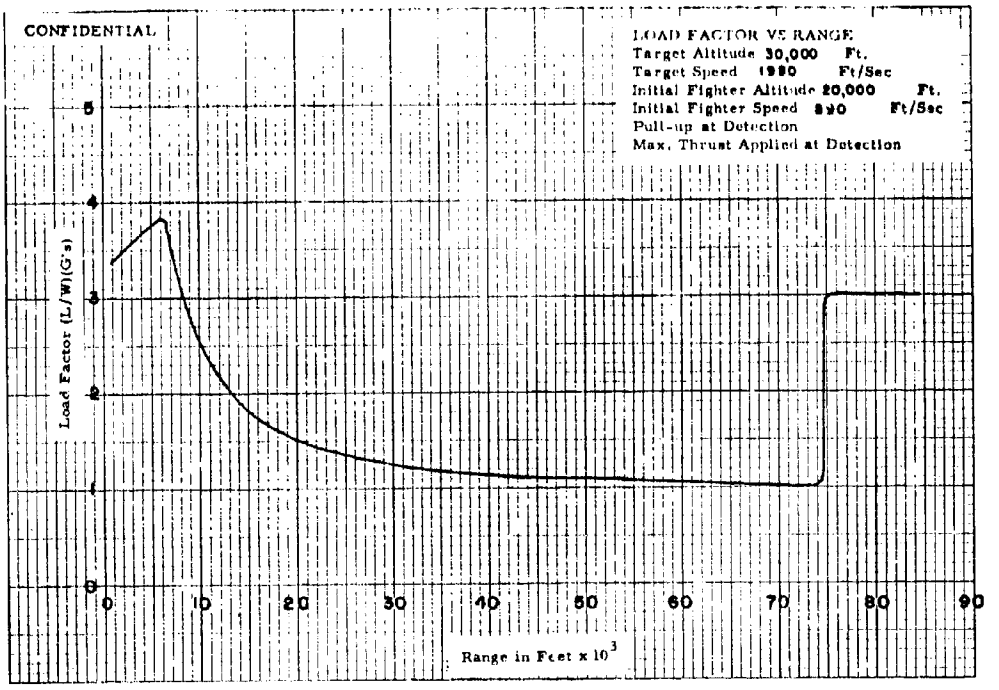


Figure 685


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

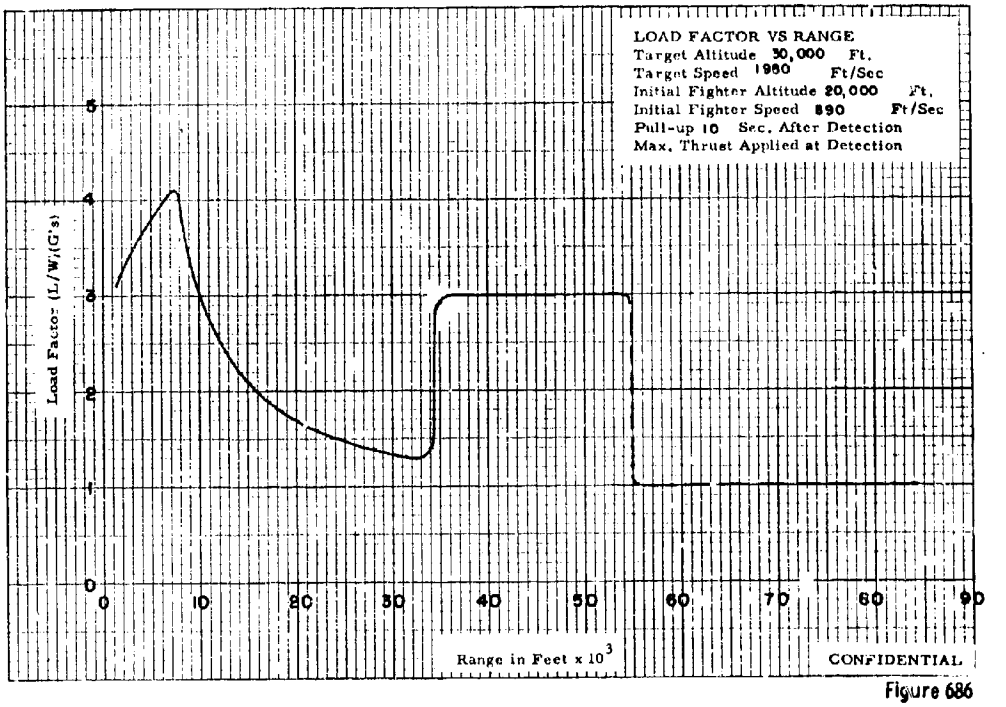

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

Figure 686

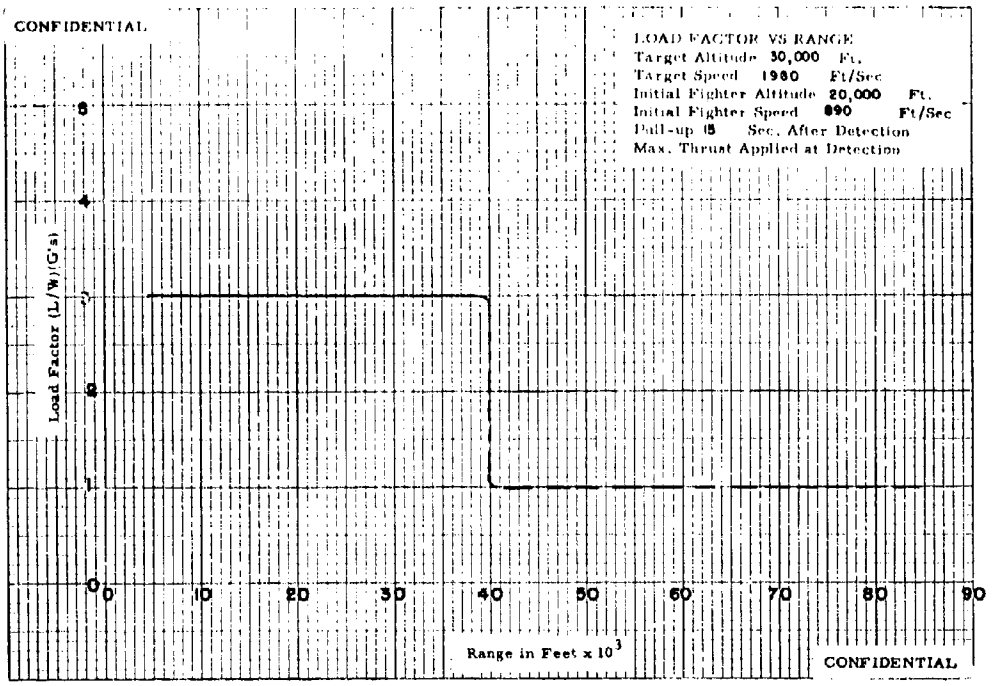


Figure 687

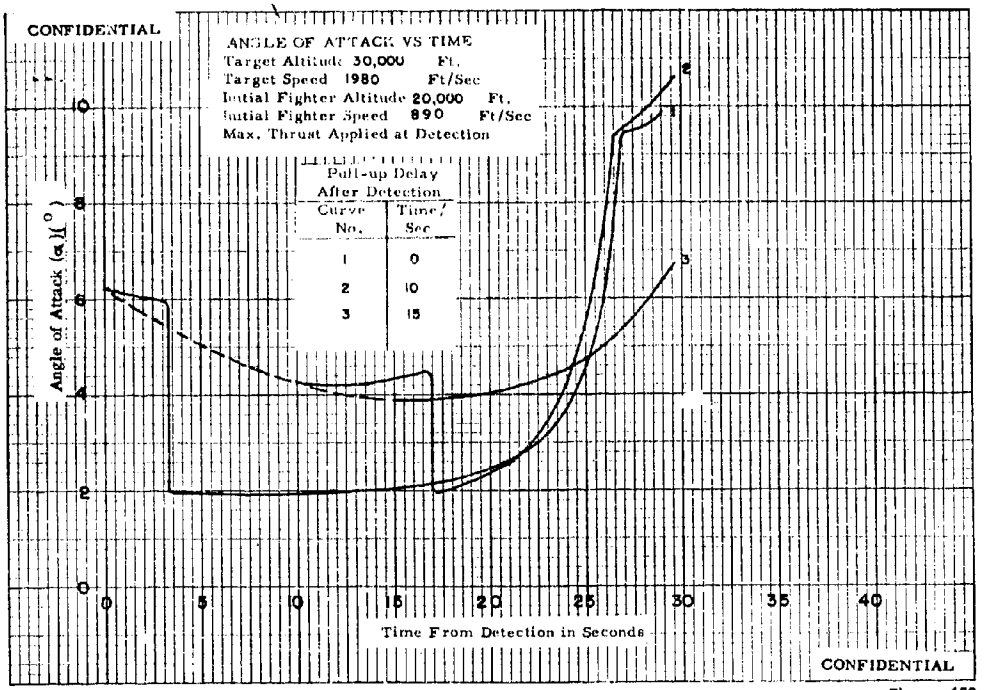


Figure 688

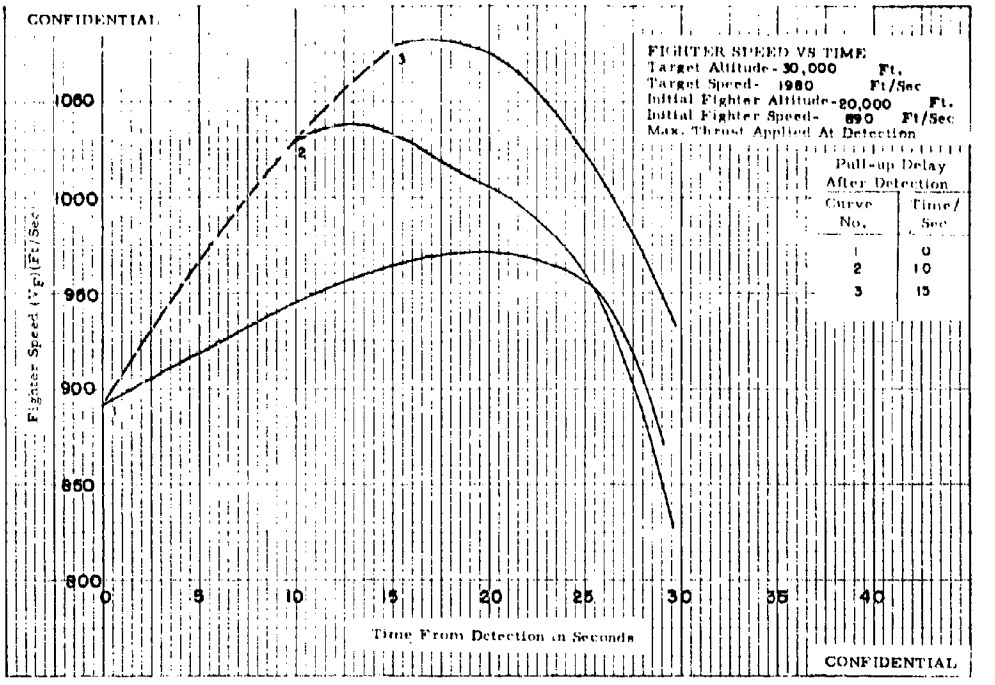


Figure 689

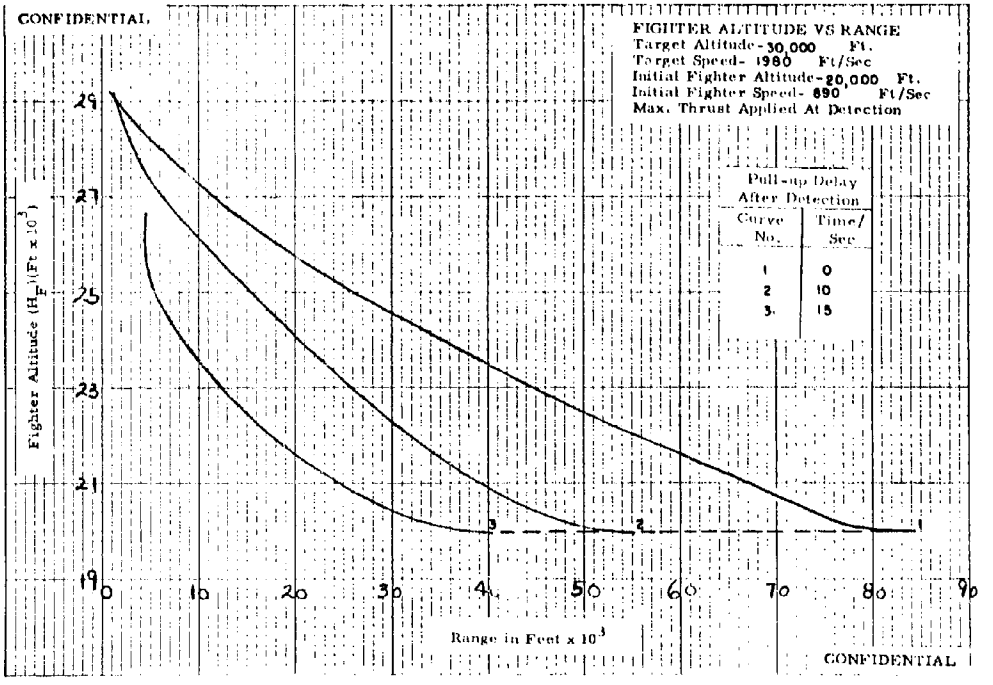
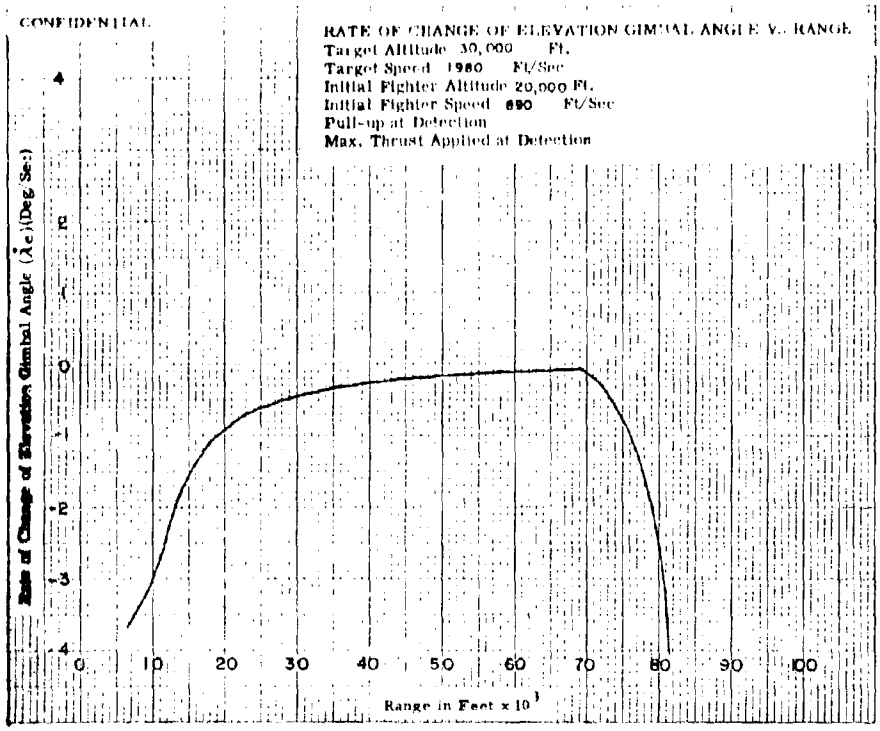


Figure 690


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS. RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
4
3
2
1
0
-1
-2
-3
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

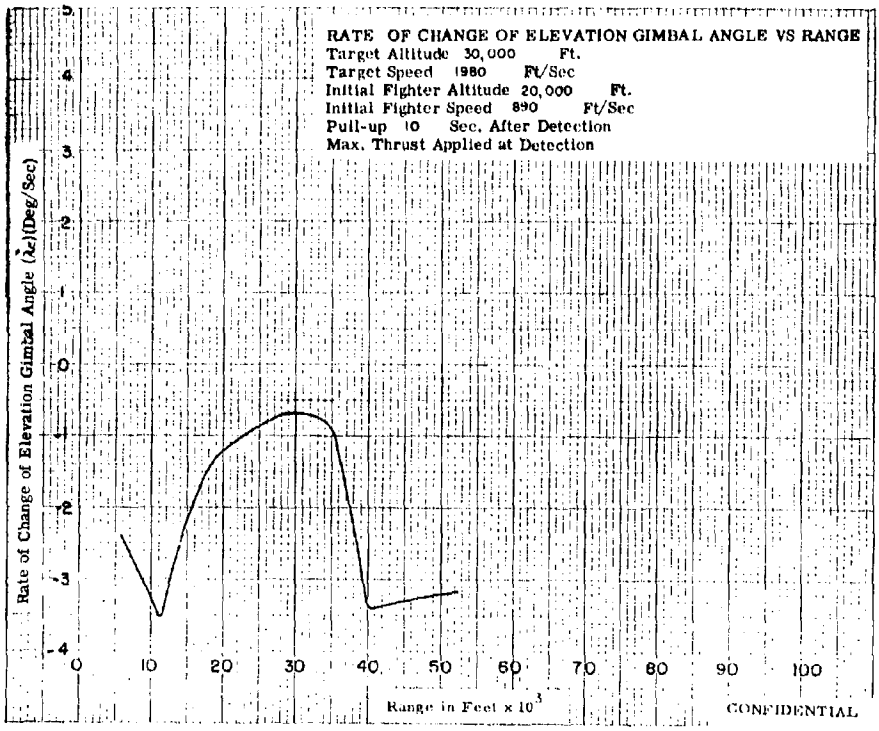
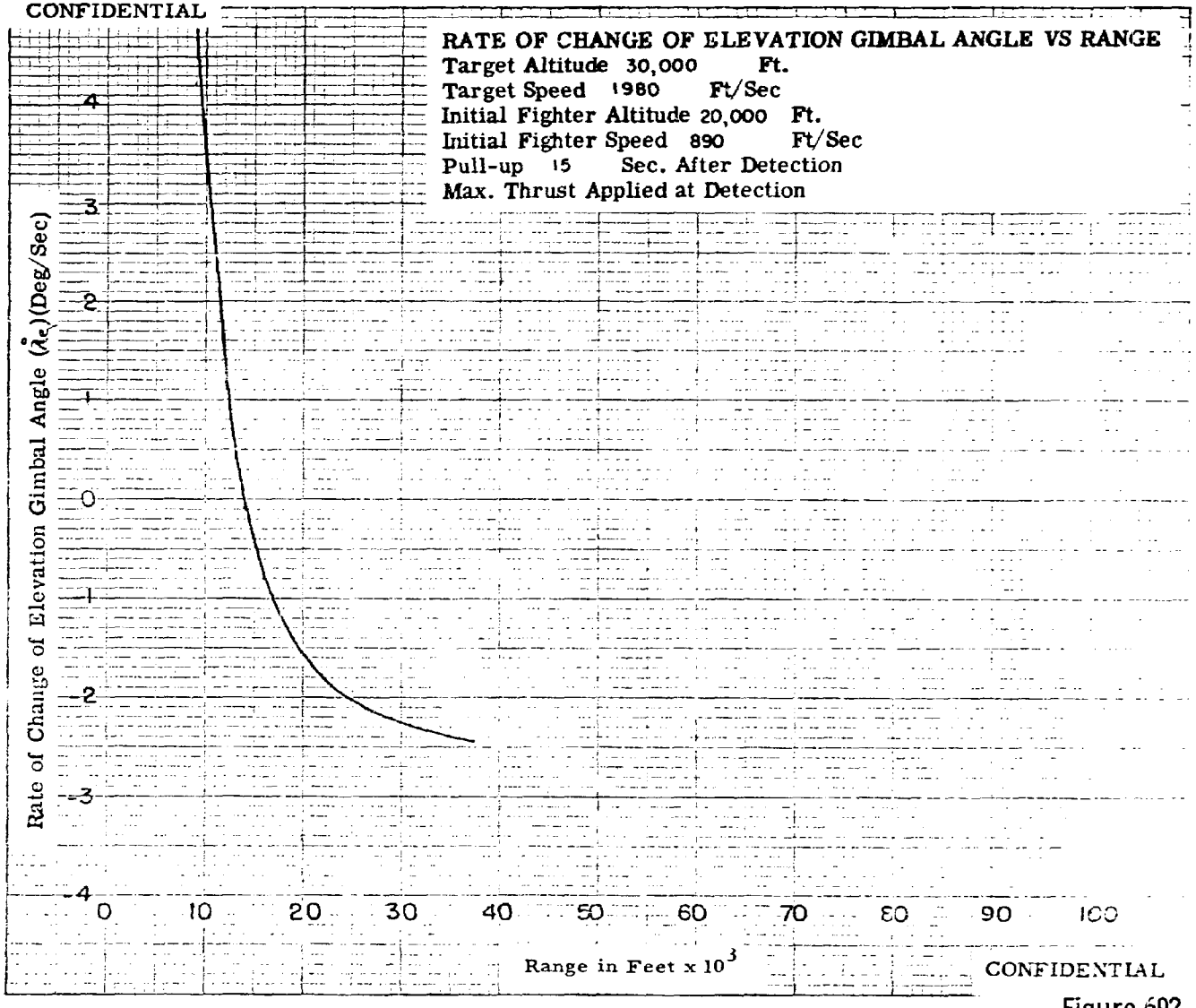

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
5
4
3
2
1
0
-1
-2
-3
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

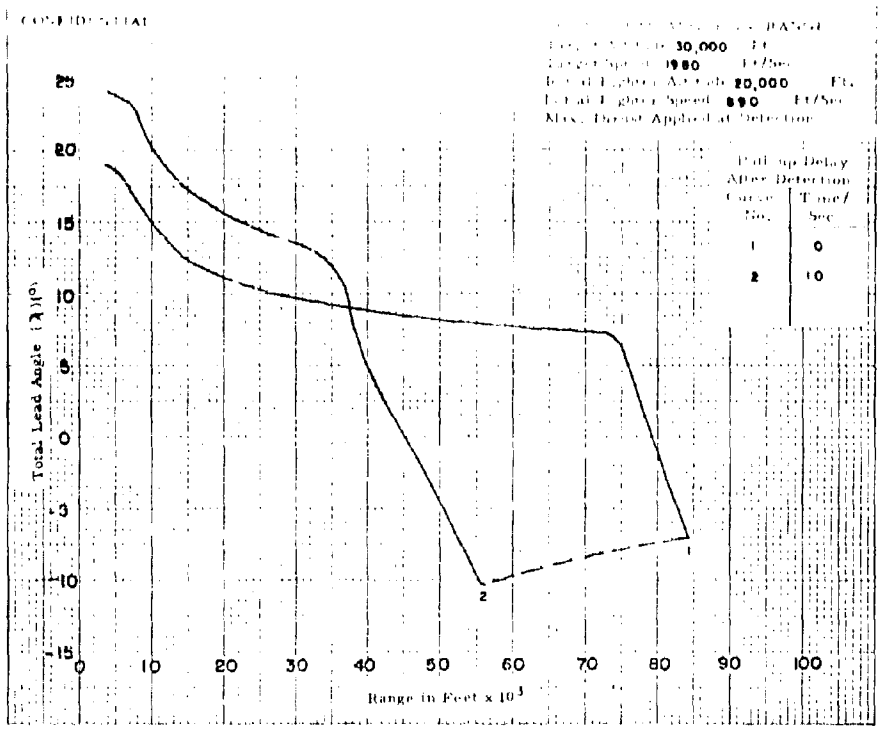
Figure 691

CONFIDENTIAL



CONFIDENTIAL

Figure 692


CONFIDENTIAL
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No.
Time / Sec
1 0
2 10
Total Lead Angle (λ)(°)
Range in Feet x 10³

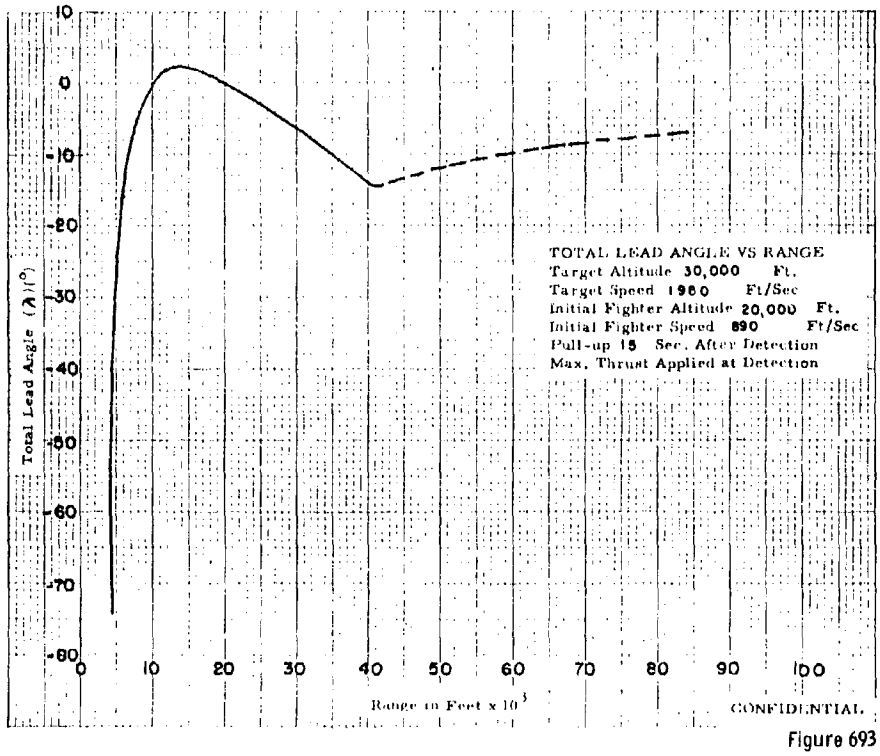
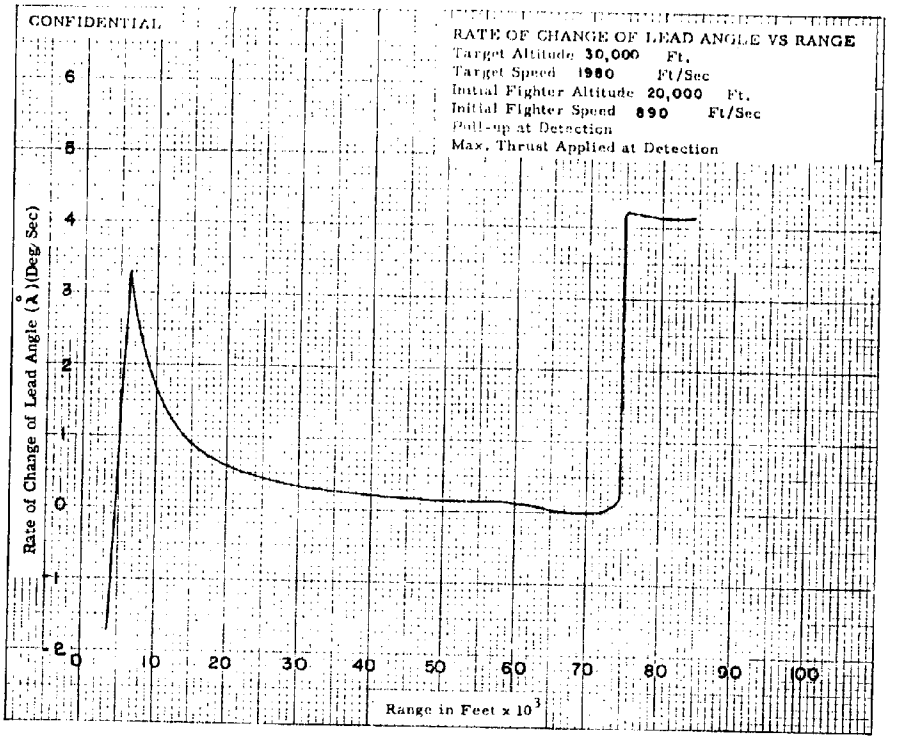

TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
Range in Feet x 10³
CONFIDENTIAL

Figure 693


CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
6
5
4
3
2
1
0
-1
-2
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

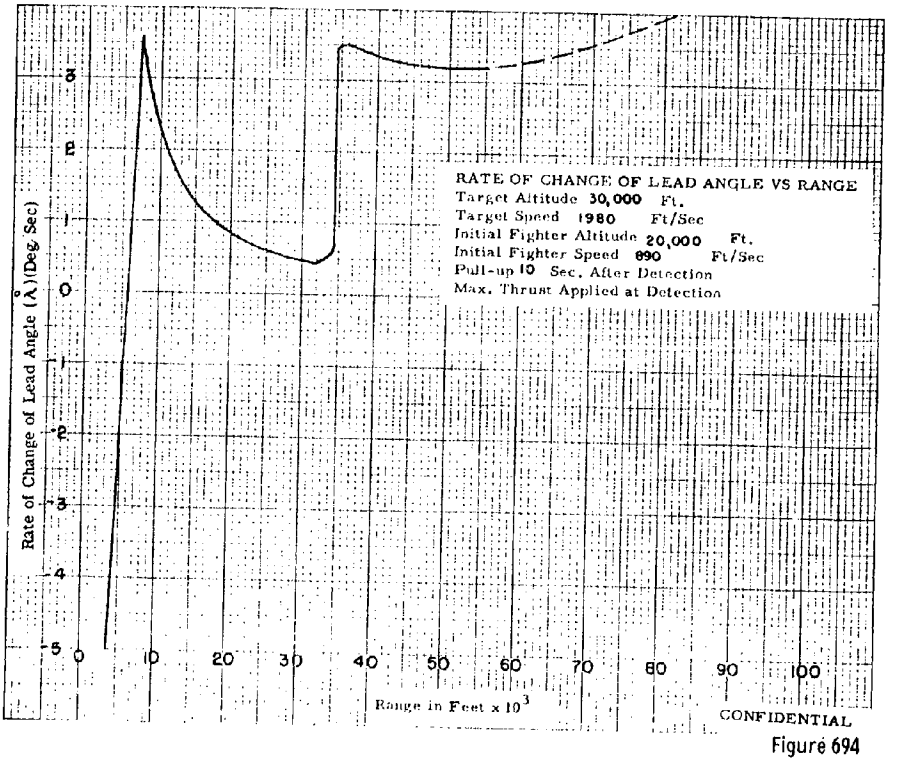

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
3
2
1
0
-1
-2
-3
-4
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 694

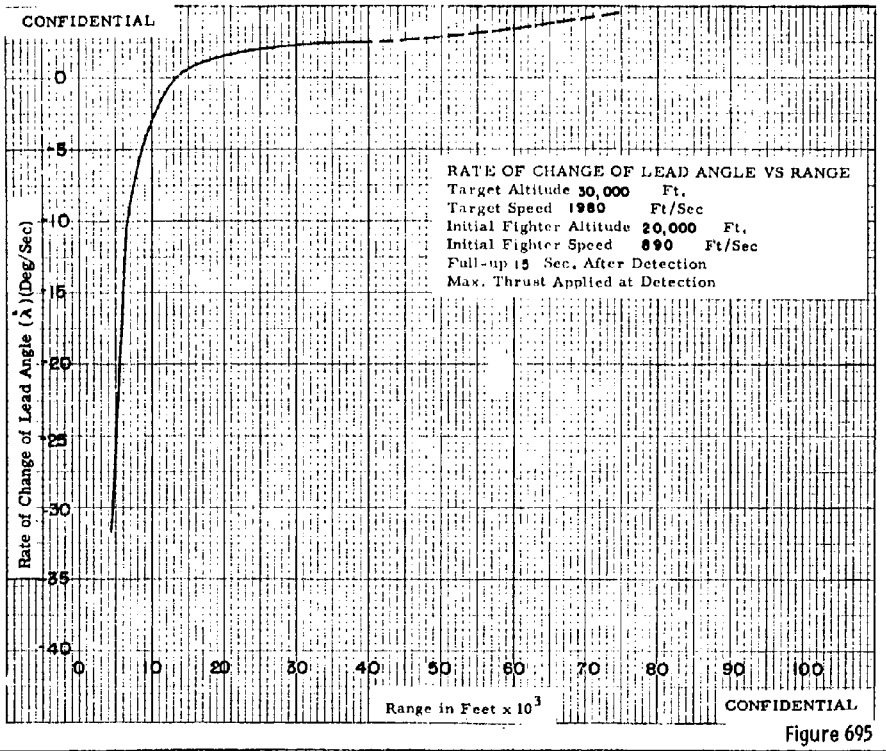


Figure 695

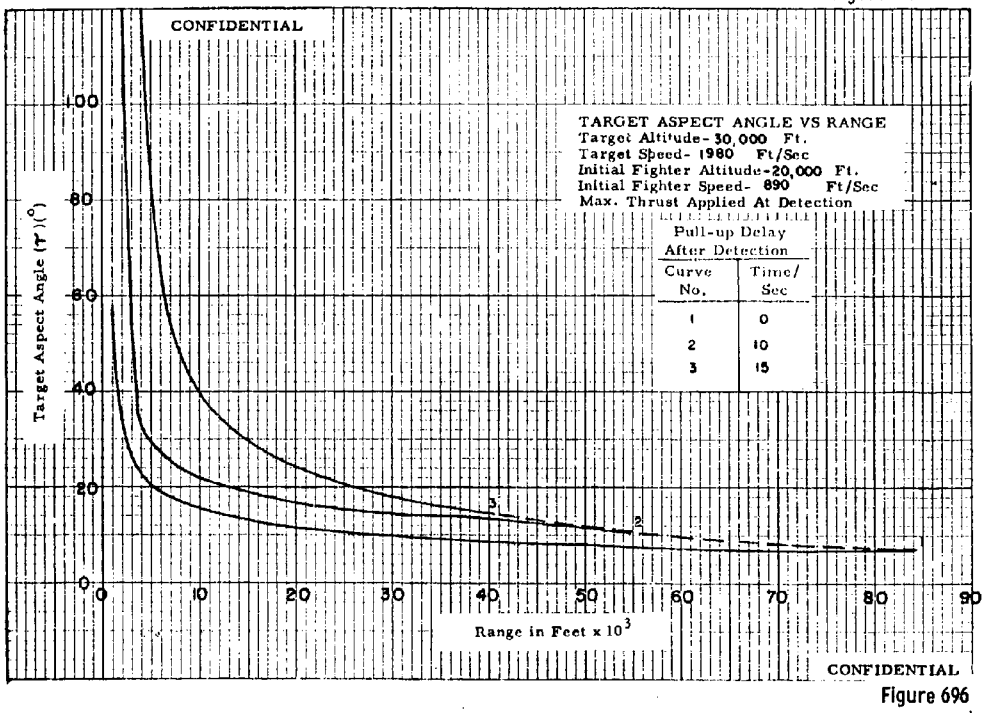
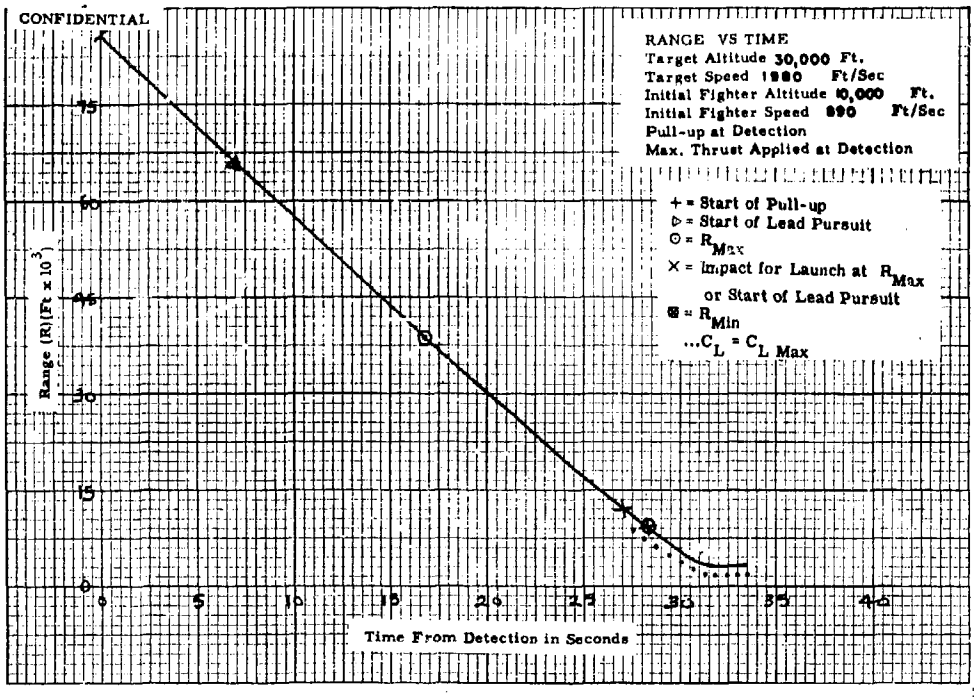
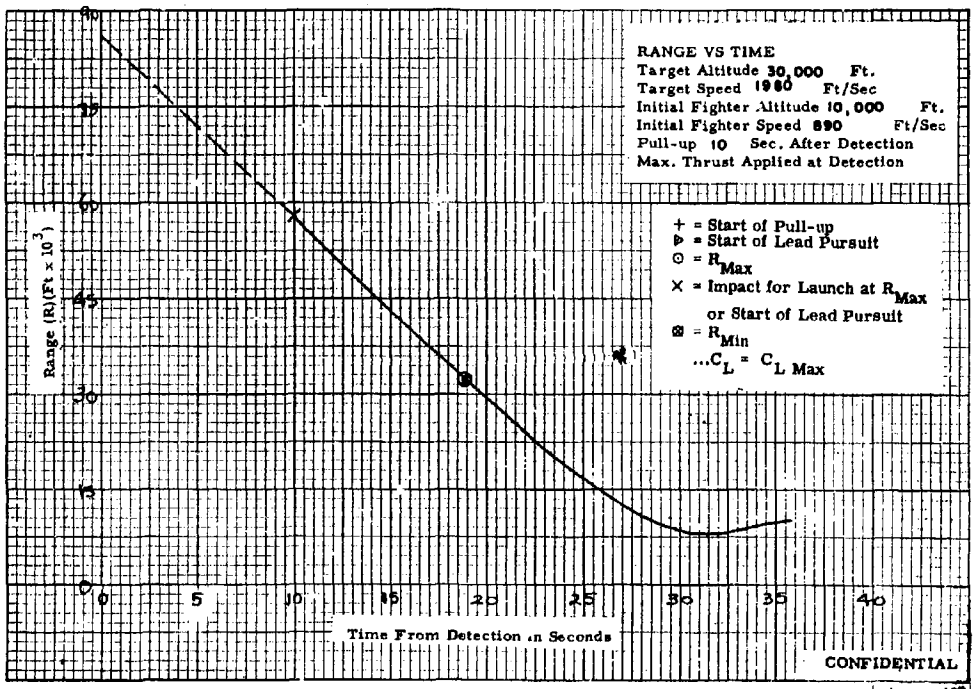


Figure 696

CONFIDENTIAL





CONFIDENTIAL

Figure 697

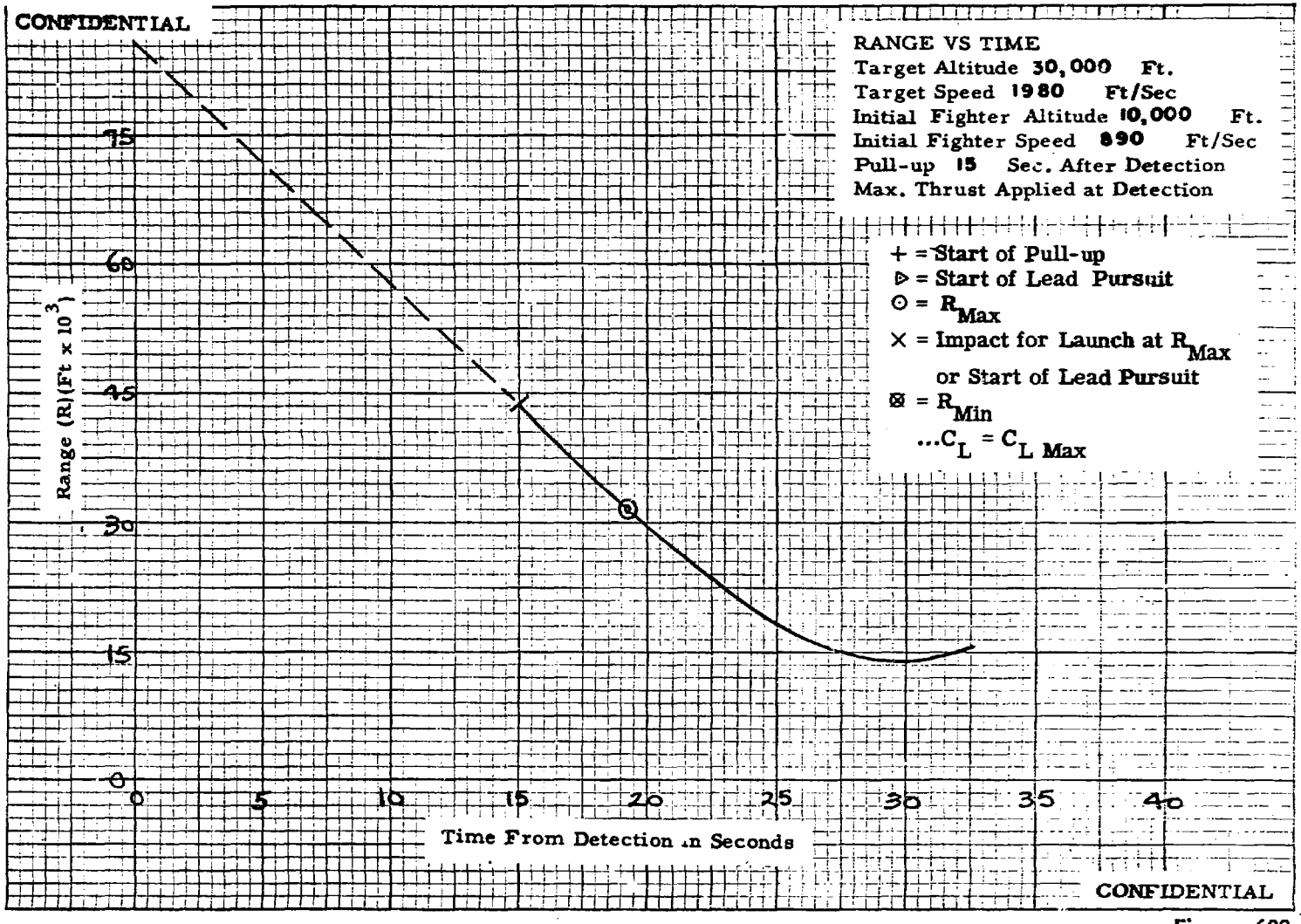
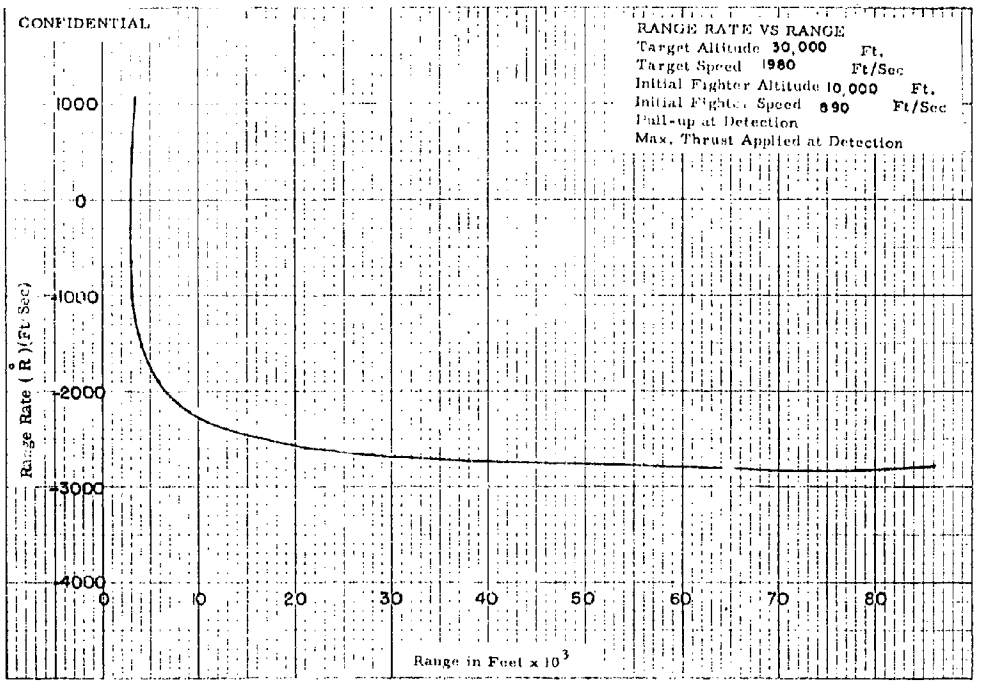

CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
75
60
45
30
15
0
0
5
10
15
20
25
30
35
40
Time From Detection in Seconds
CONFIDENTIAL

Figure 698


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

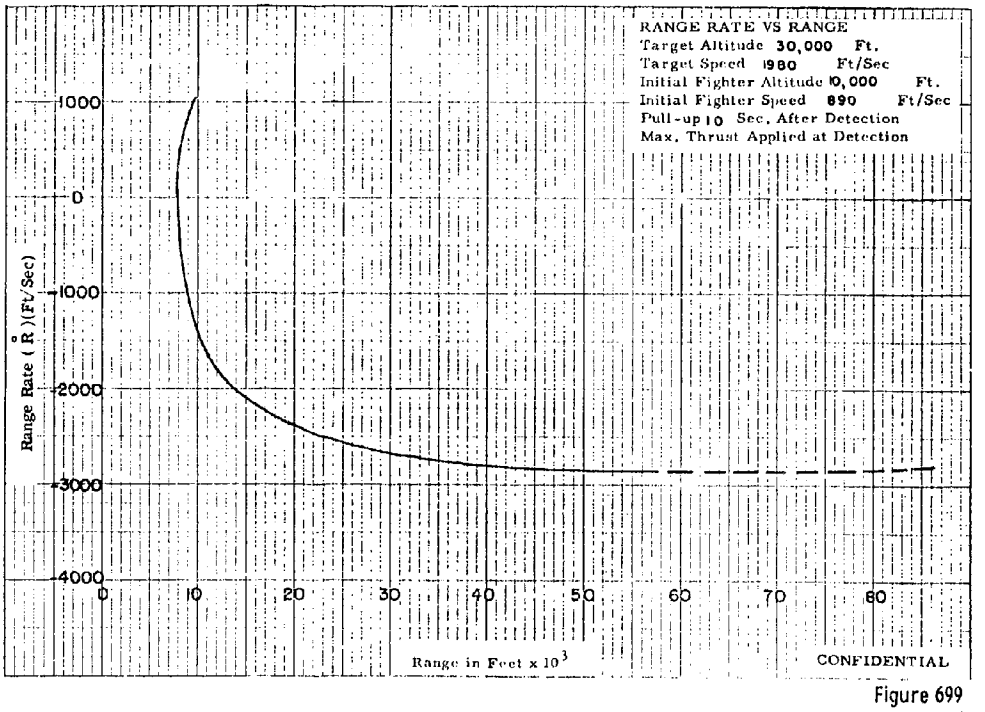

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 699

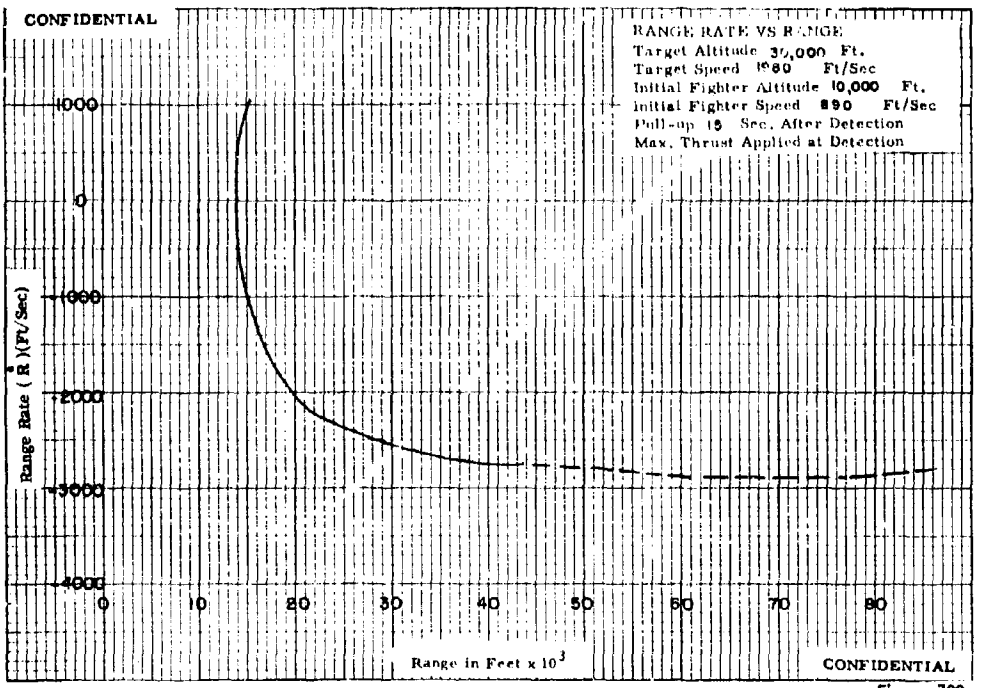


Figure 700

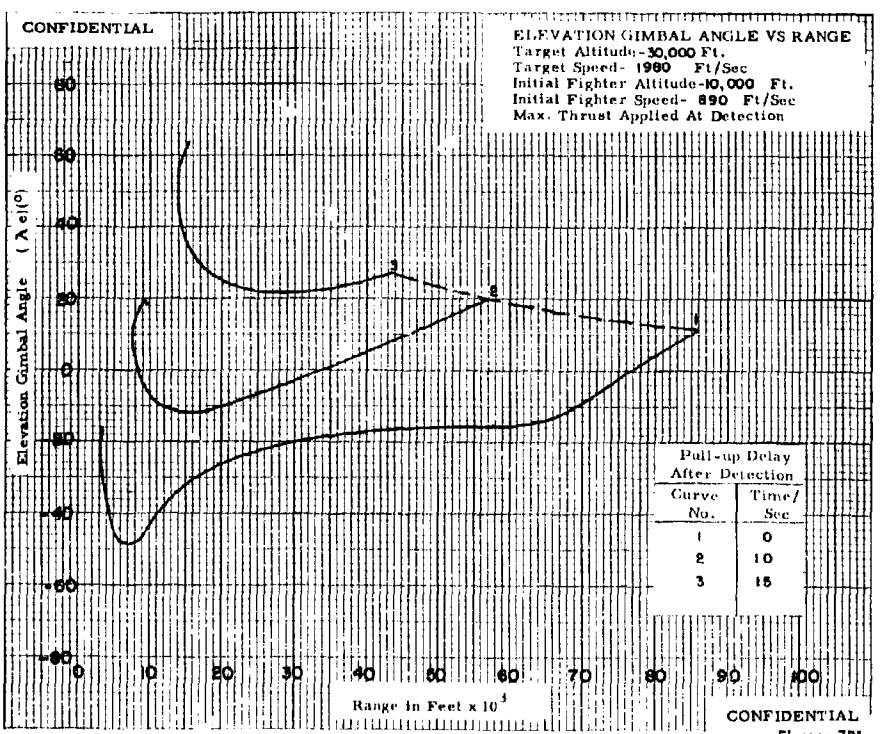


Figure 701

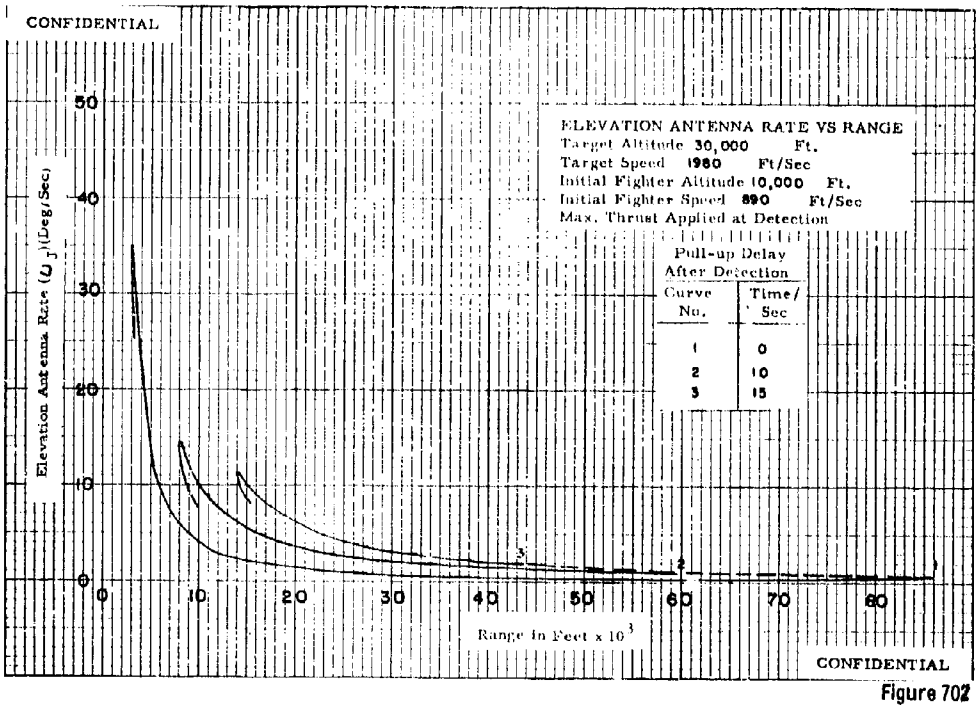


Figure 702

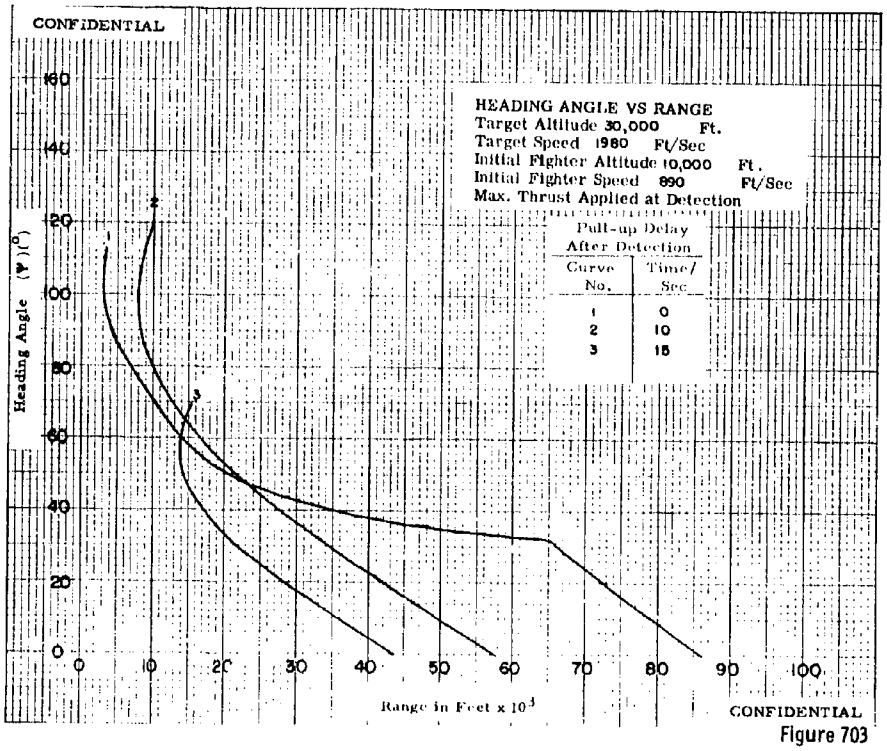
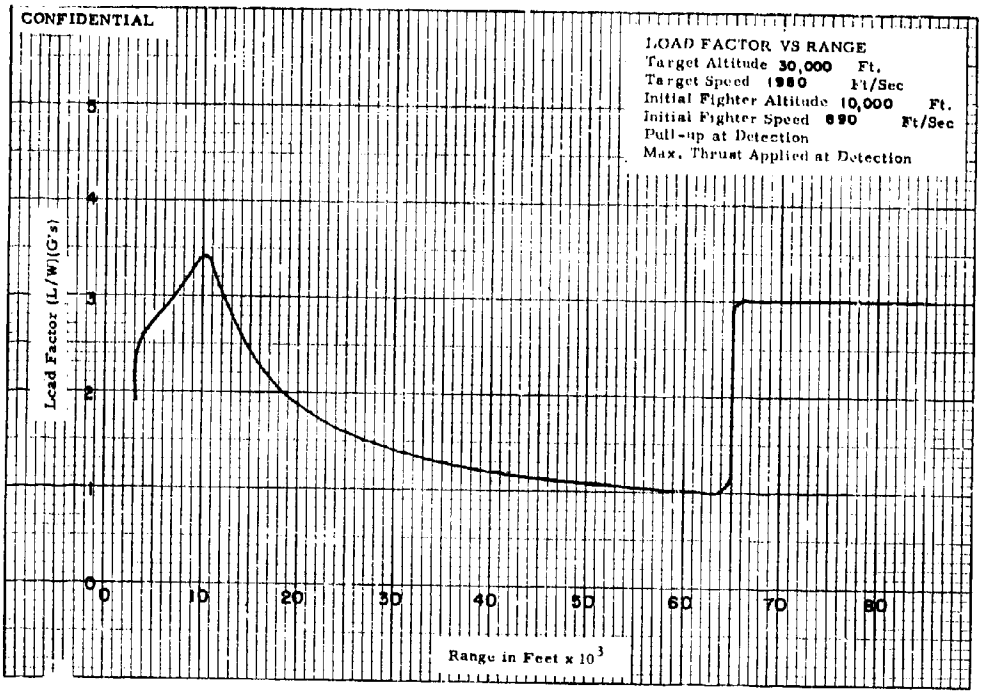


Figure 703


LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
0
1
2
3
4
5
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

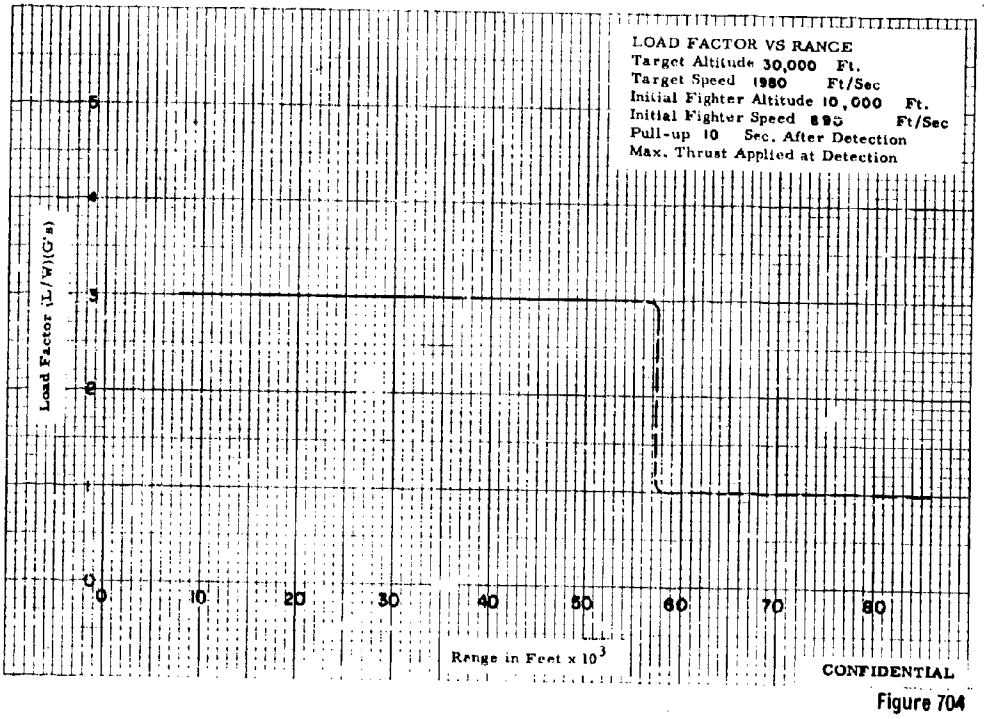

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
0
1
2
3
4
5
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

Figure 704

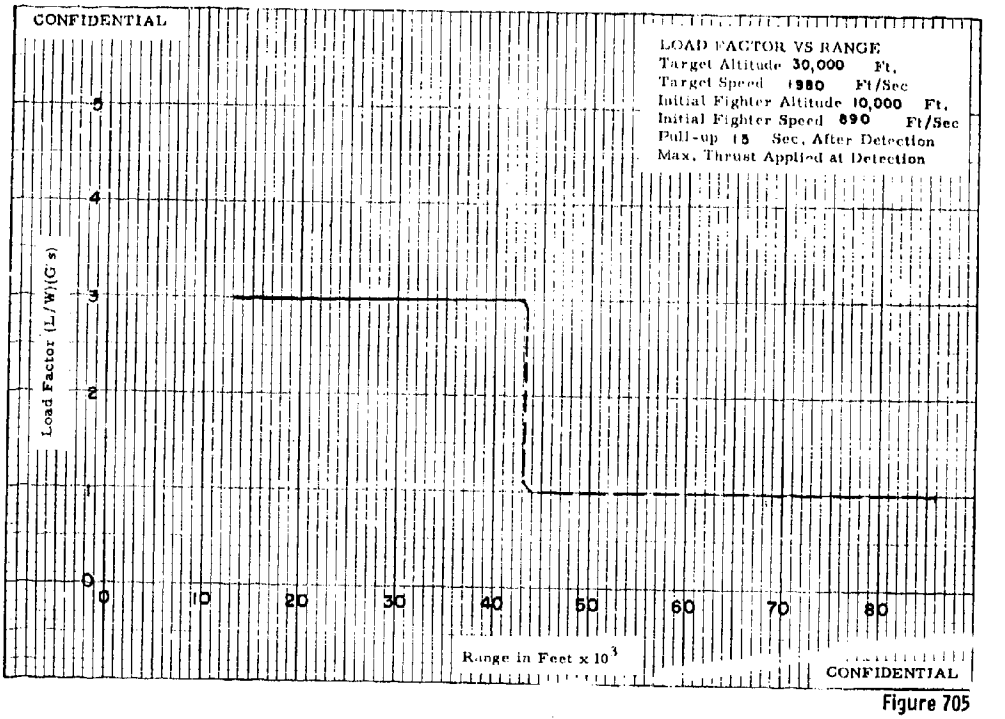


Figure 705

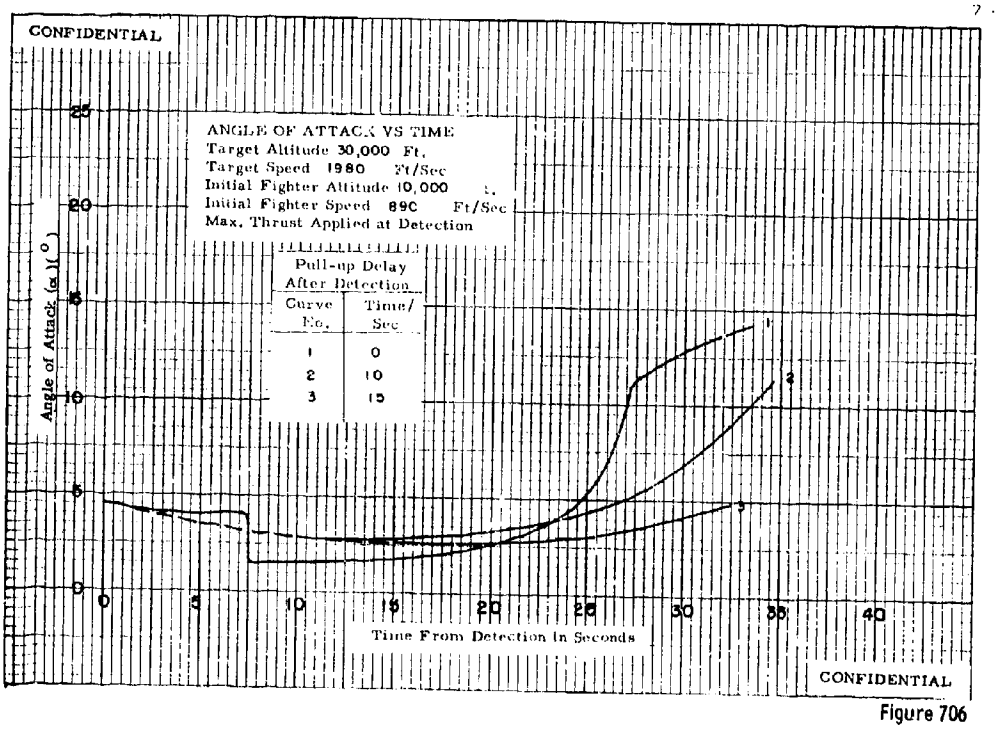


Figure 706

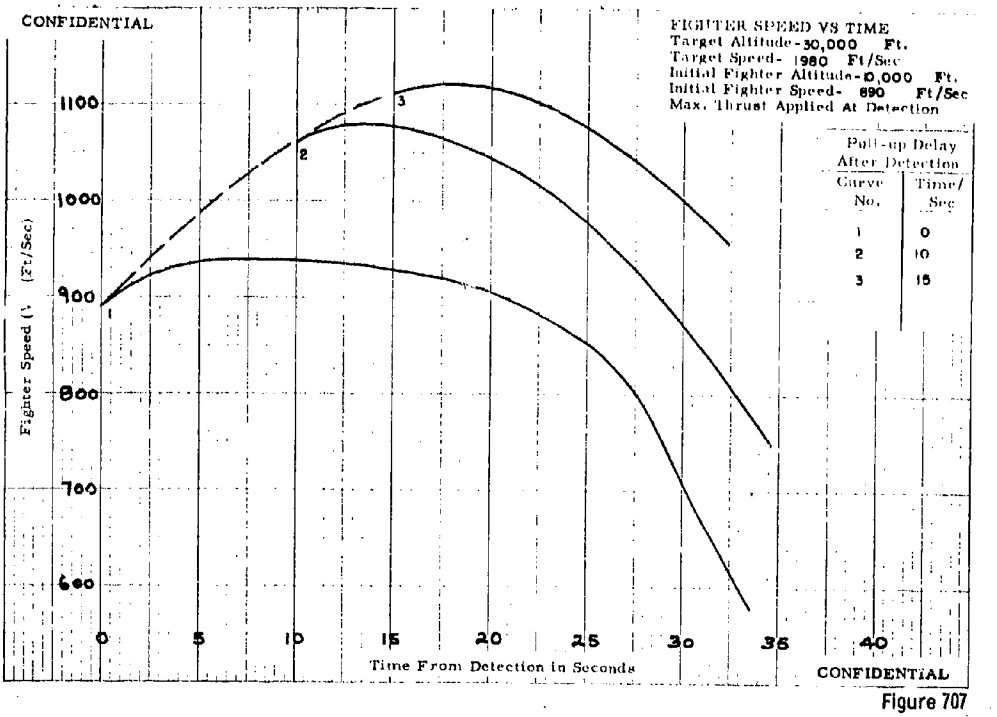


Figure 707

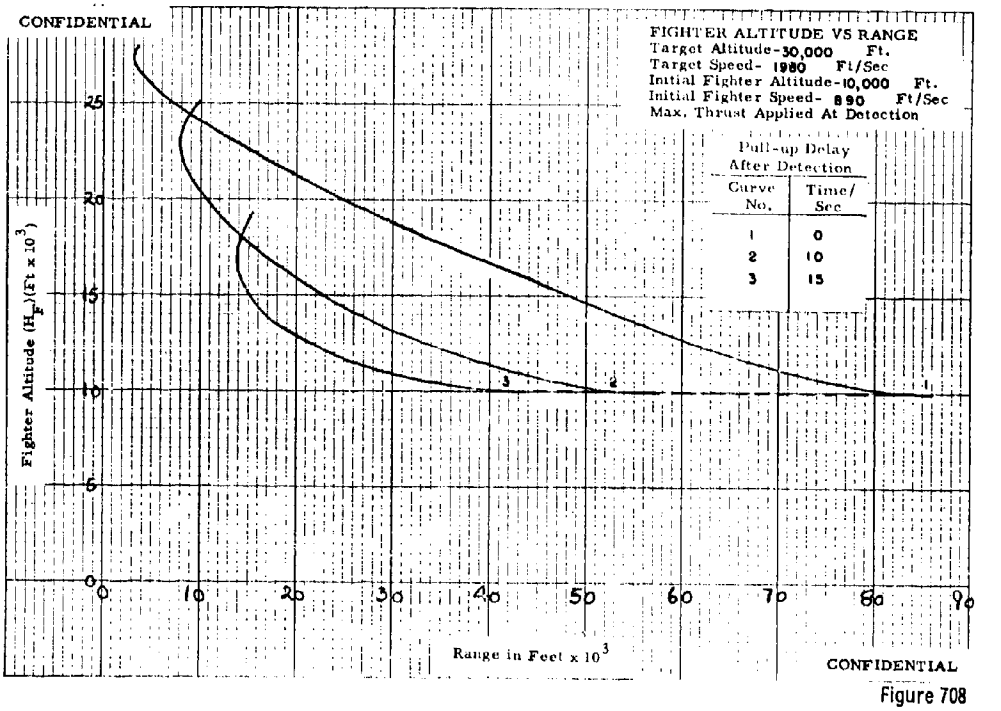
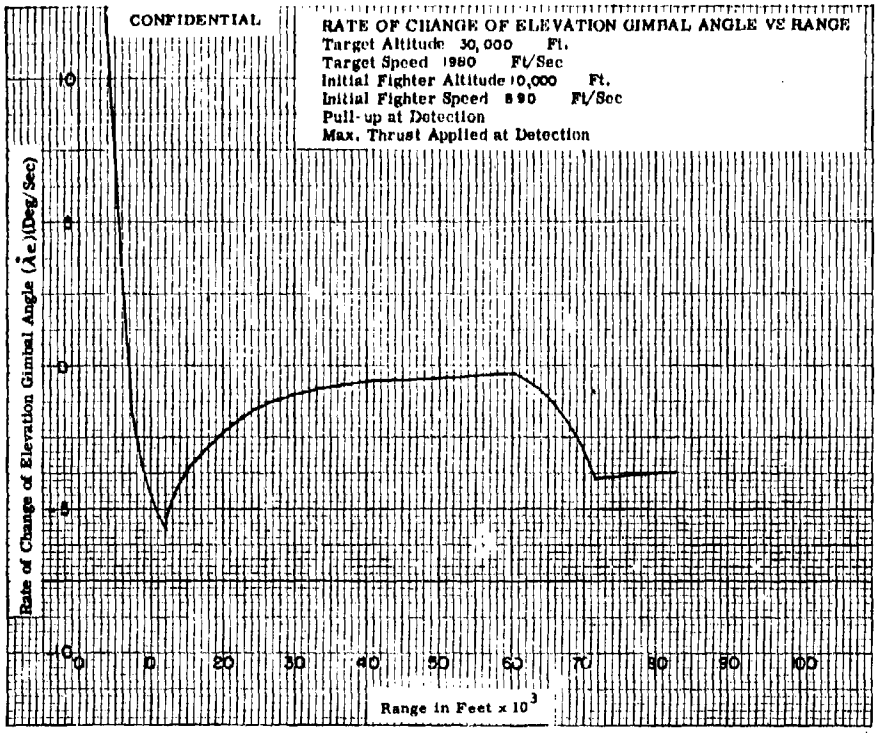


Figure 708


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
Range in Feet x 10^3

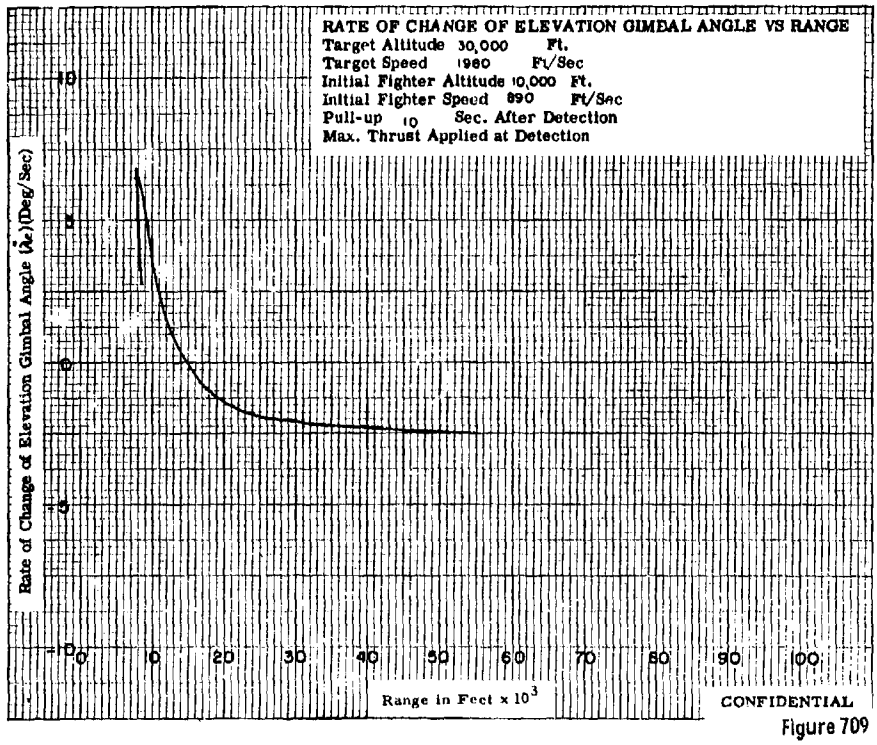

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
Range in Feet x 10^3

Figure 709

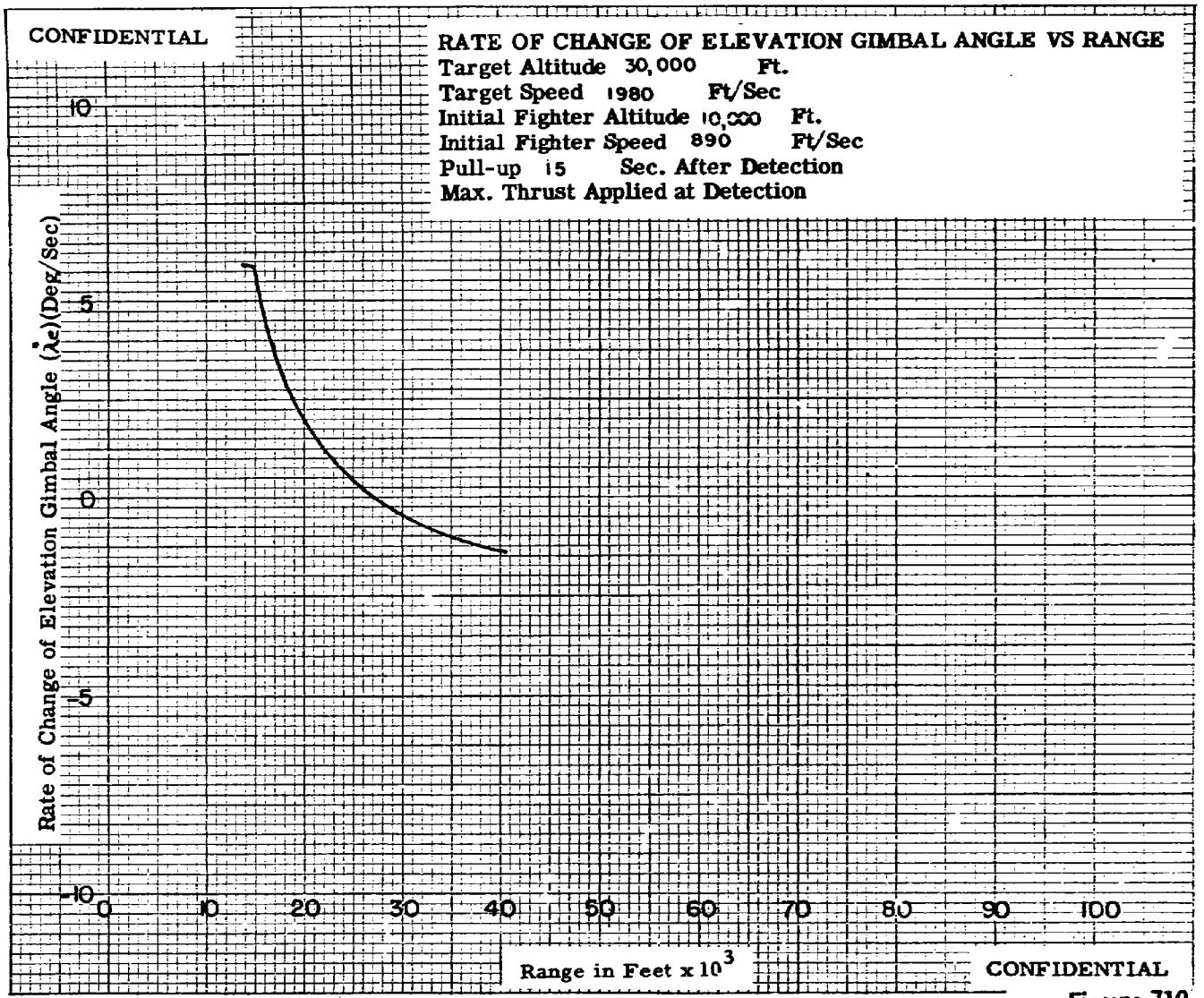
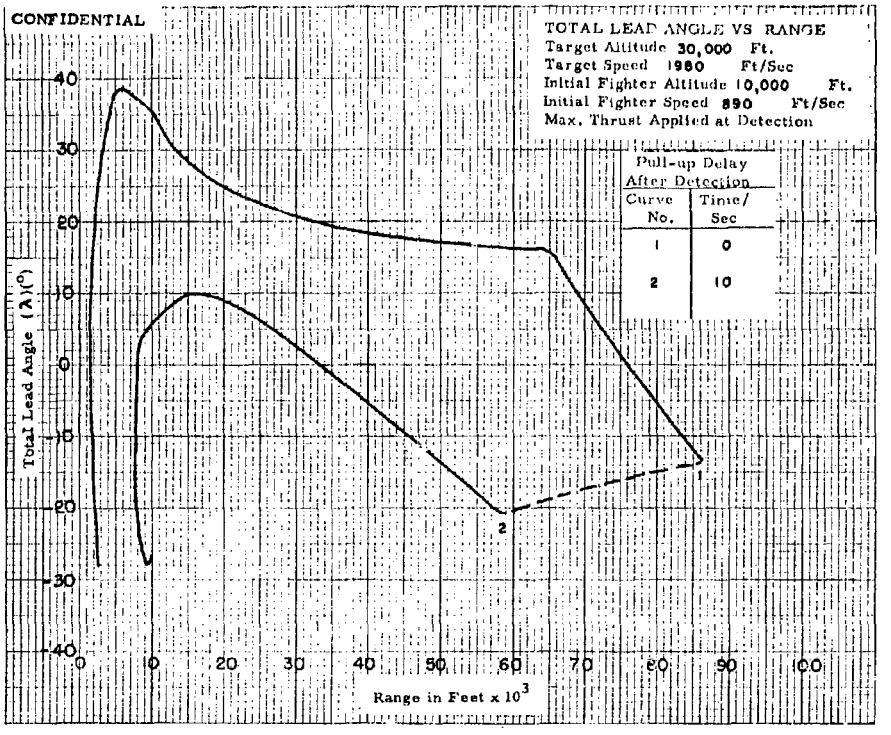
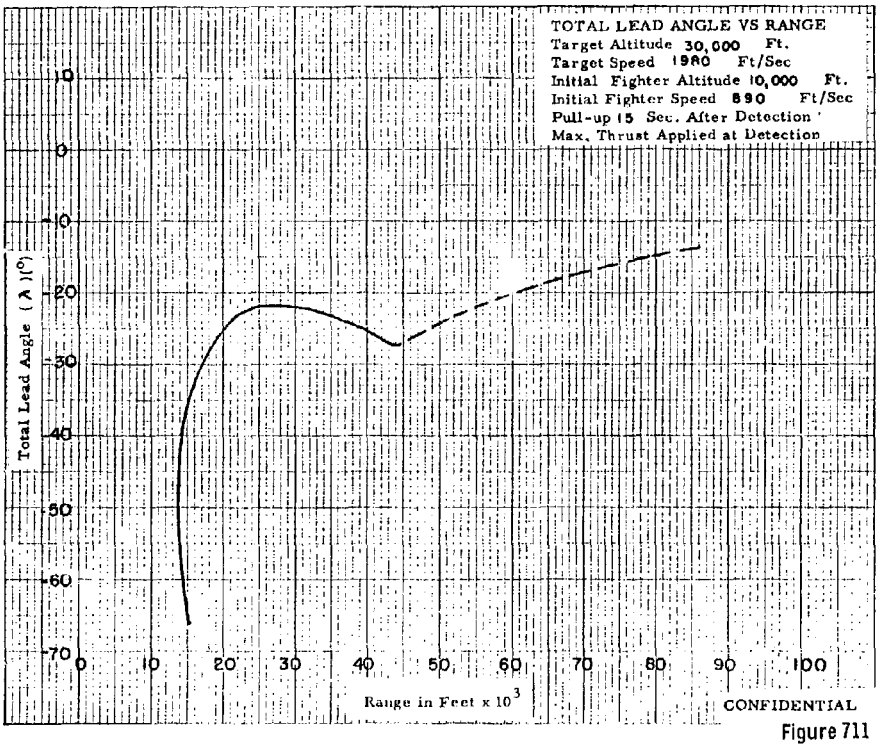

CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}e$)(Deg/Sec)
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 710

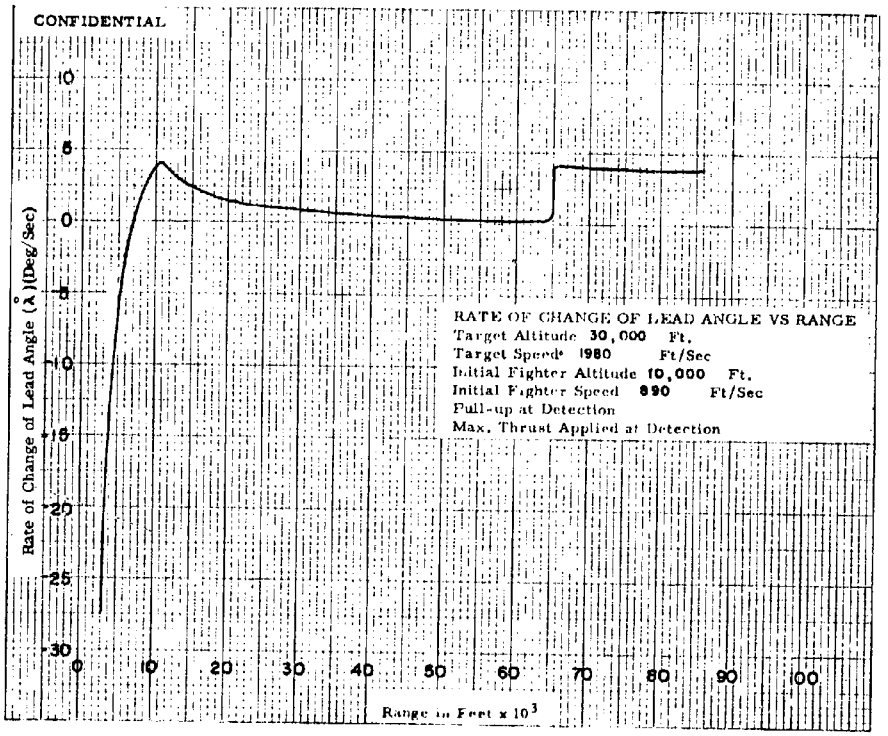
CONFIDENTIAL





CONFIDENTIAL

Figure 711


Rate of Change of Lead Angle (λ̇) (Deg/Sec)
10
5
0
-5
-10
-15
-20
-25
-30
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection

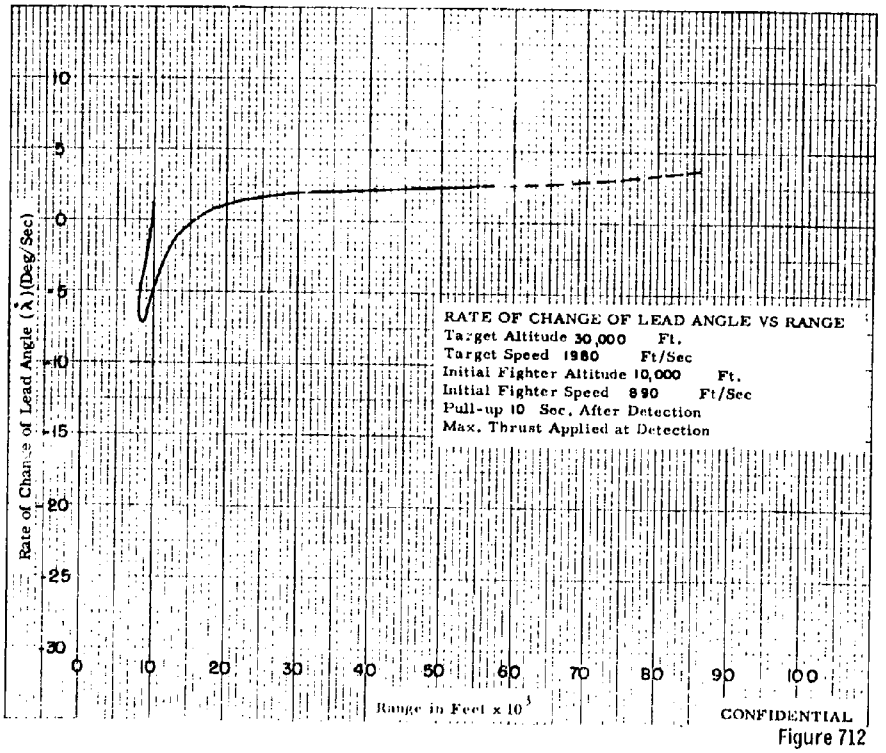

Rate of Change of Lead Angle (λ̇) (Deg/Sec)
10
5
0
-5
-10
-15
-20
-25
-30
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection

Figure 712

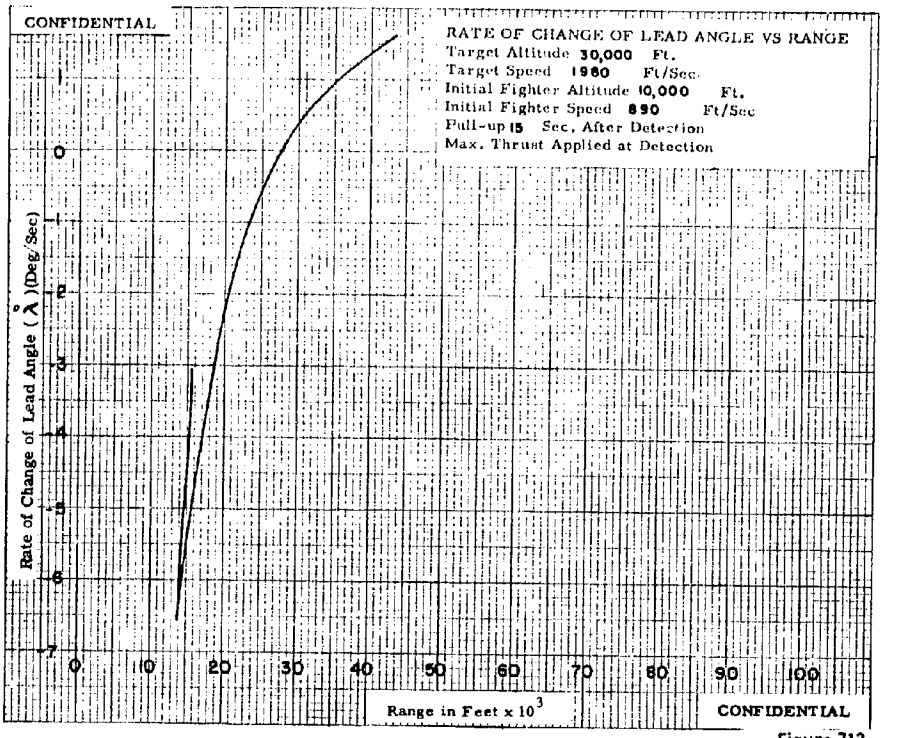


Figure 713

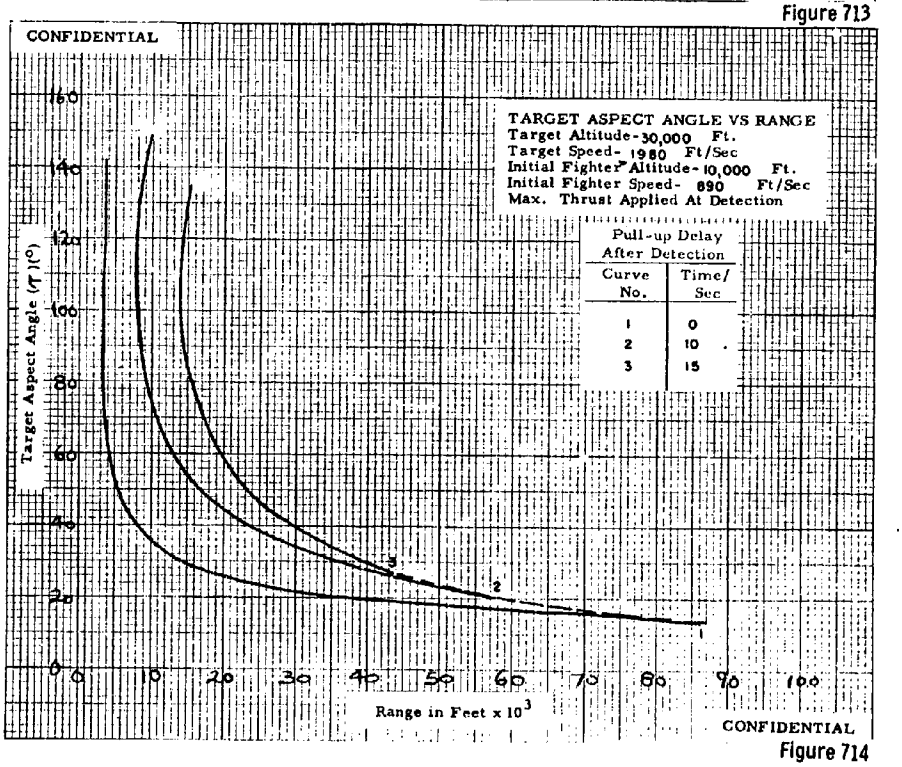
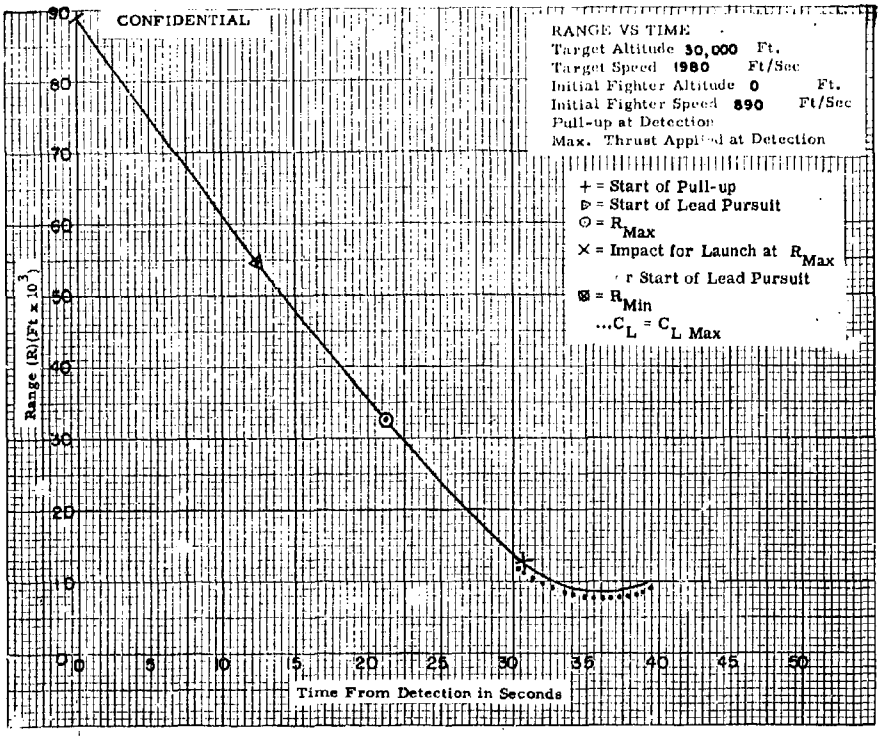


Figure 714


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

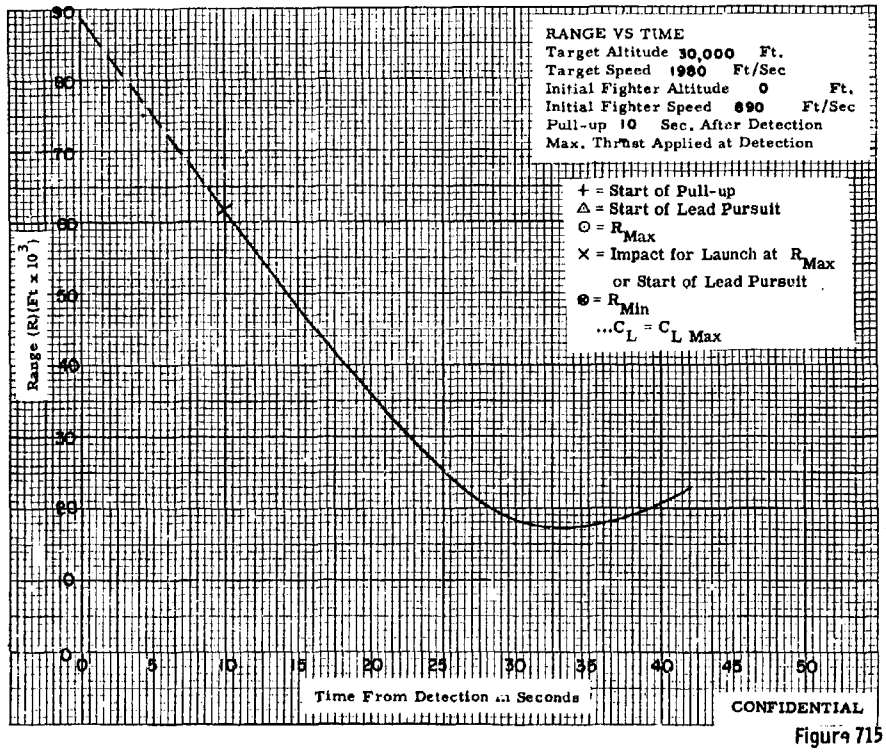

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 715

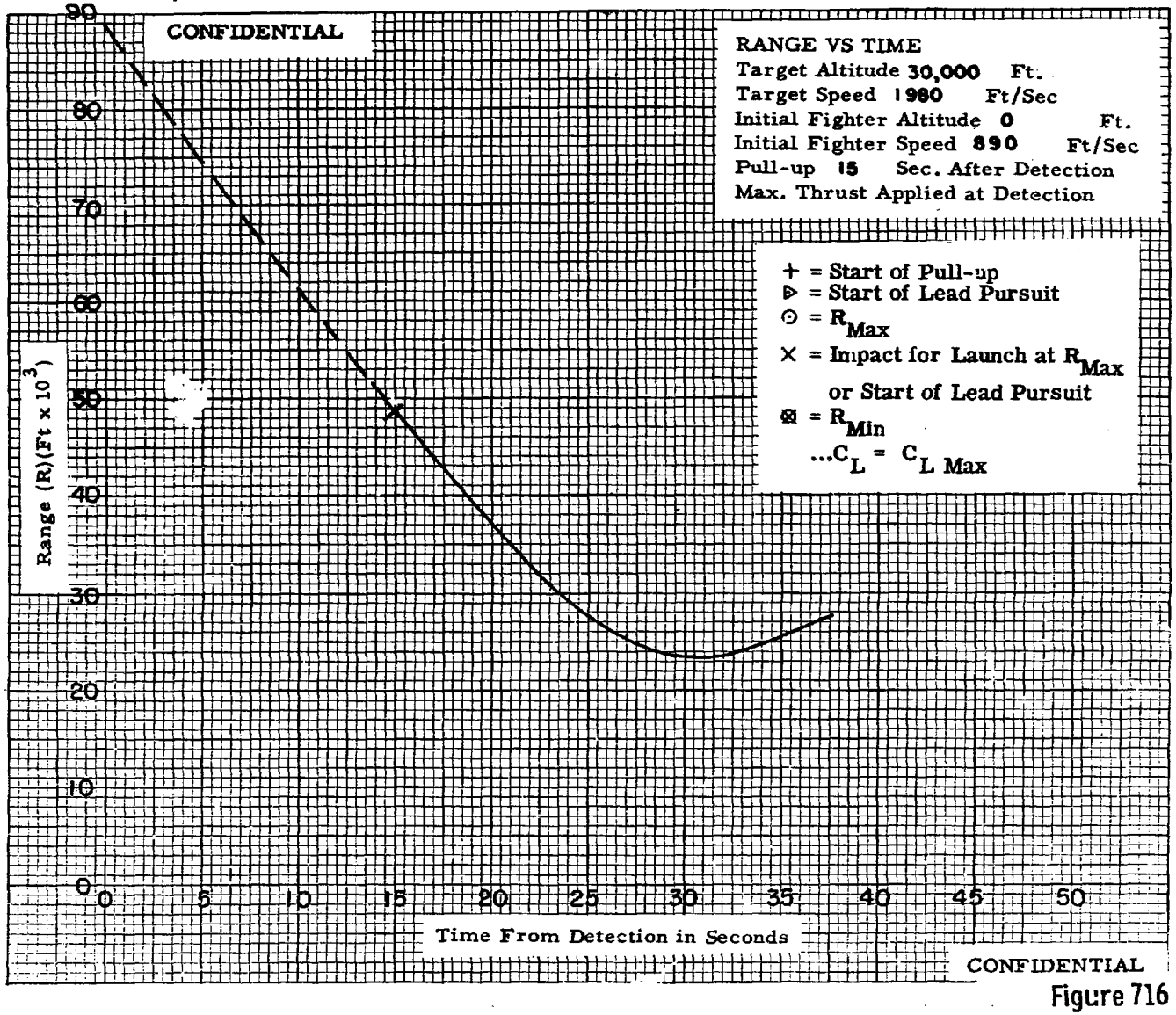
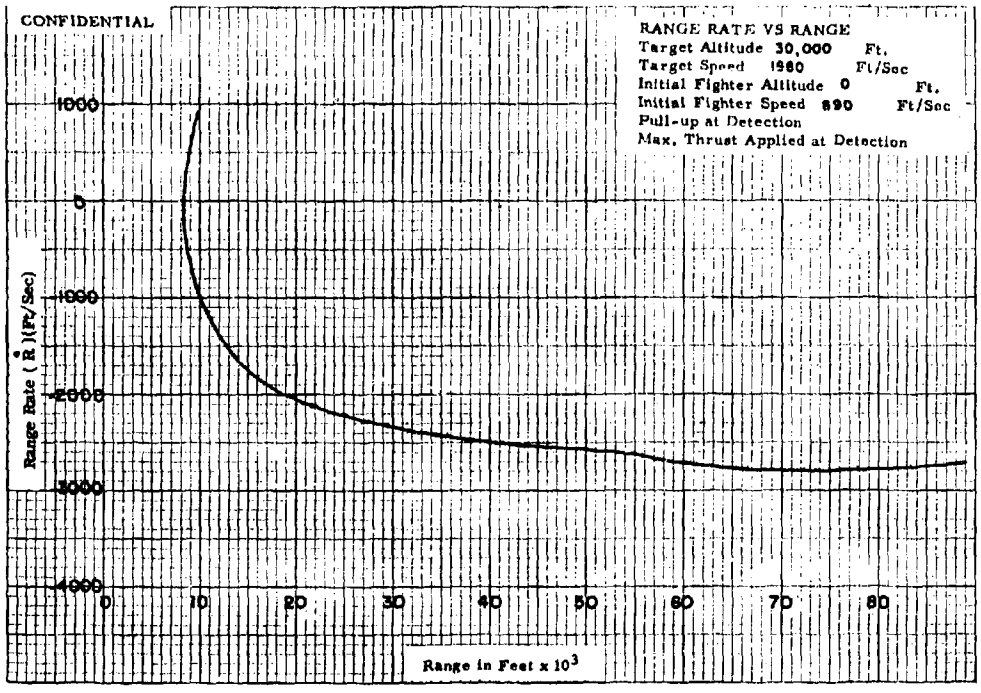

CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊠ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
CONFIDENTIAL

Figure 716


RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

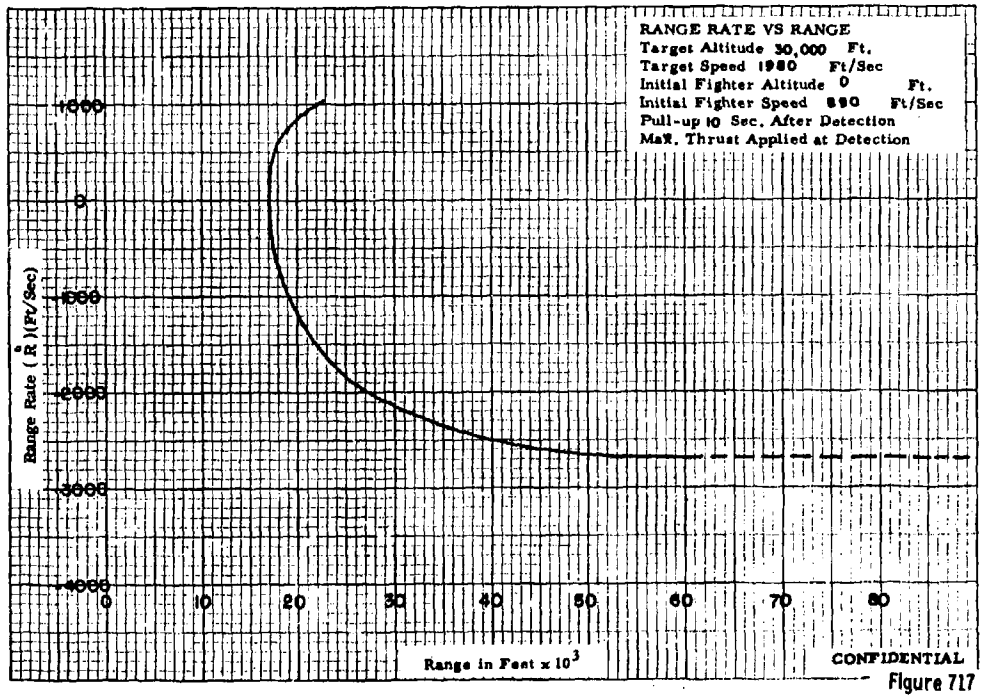

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

Figure 717

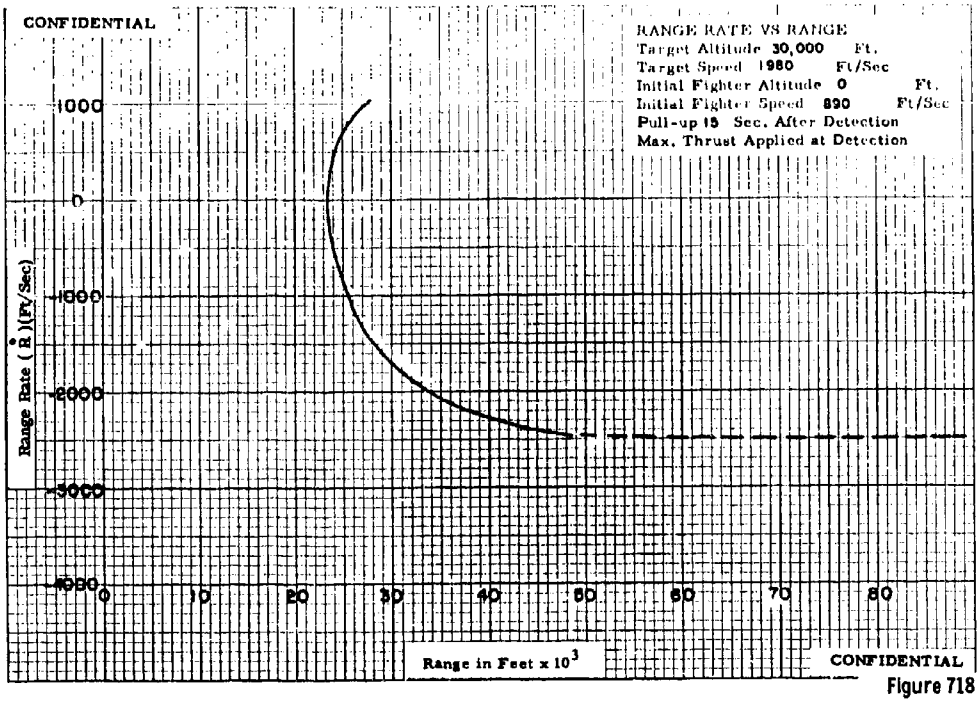


Figure 718

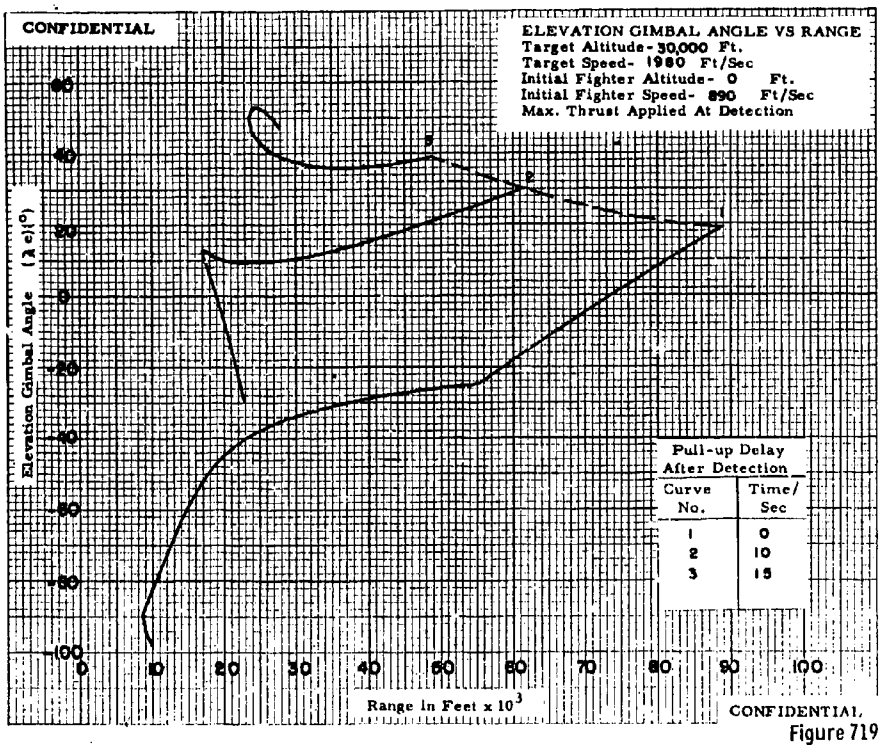


Figure 719

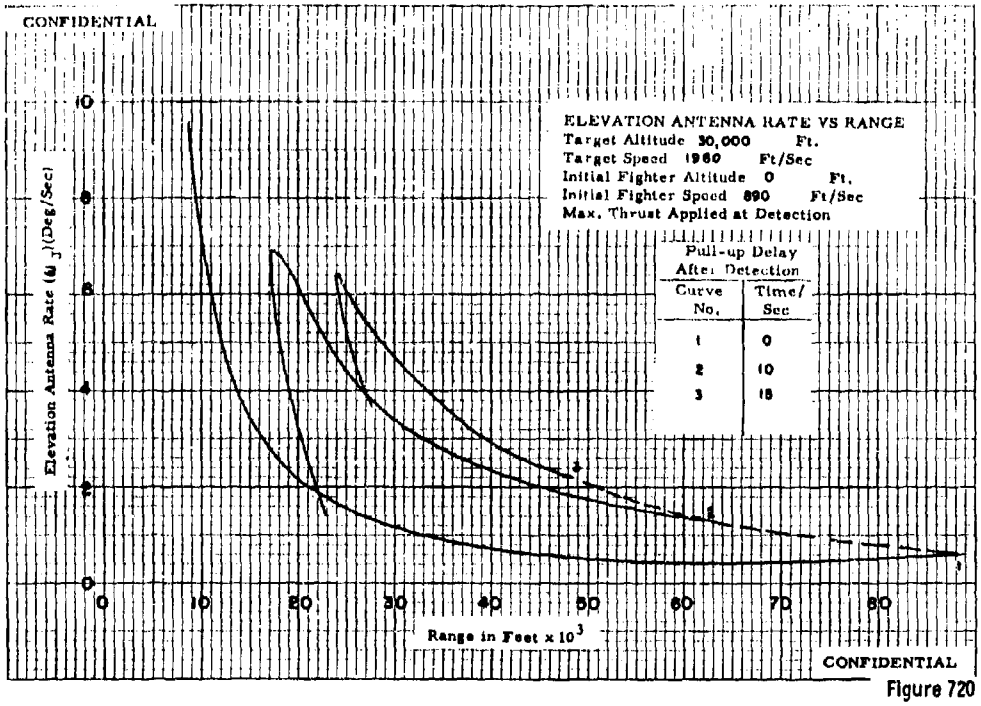


Figure 720

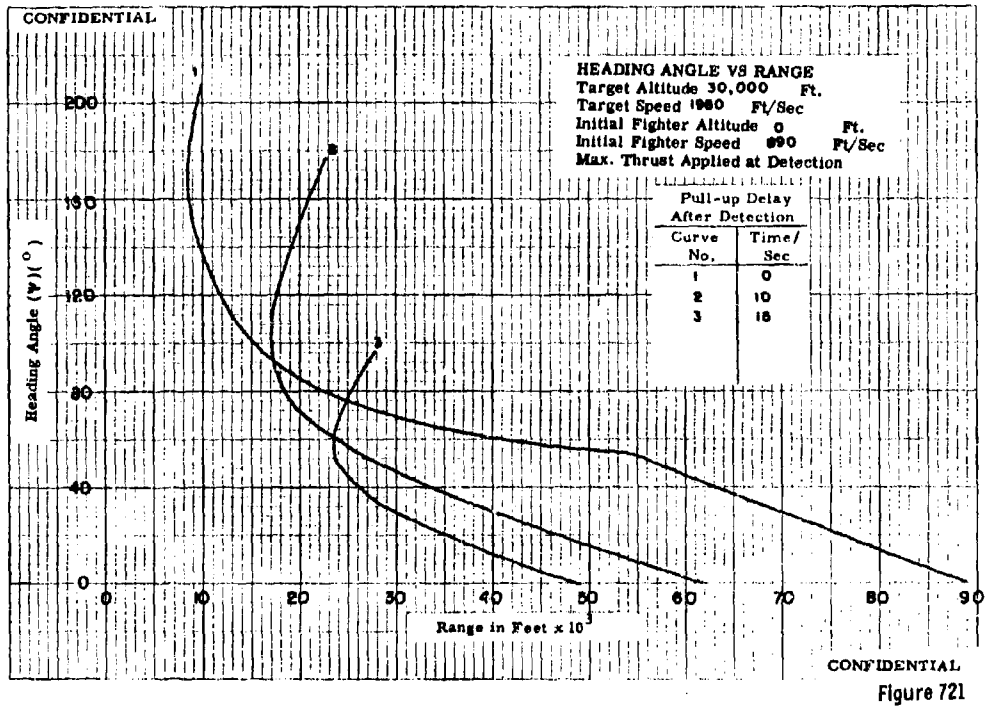
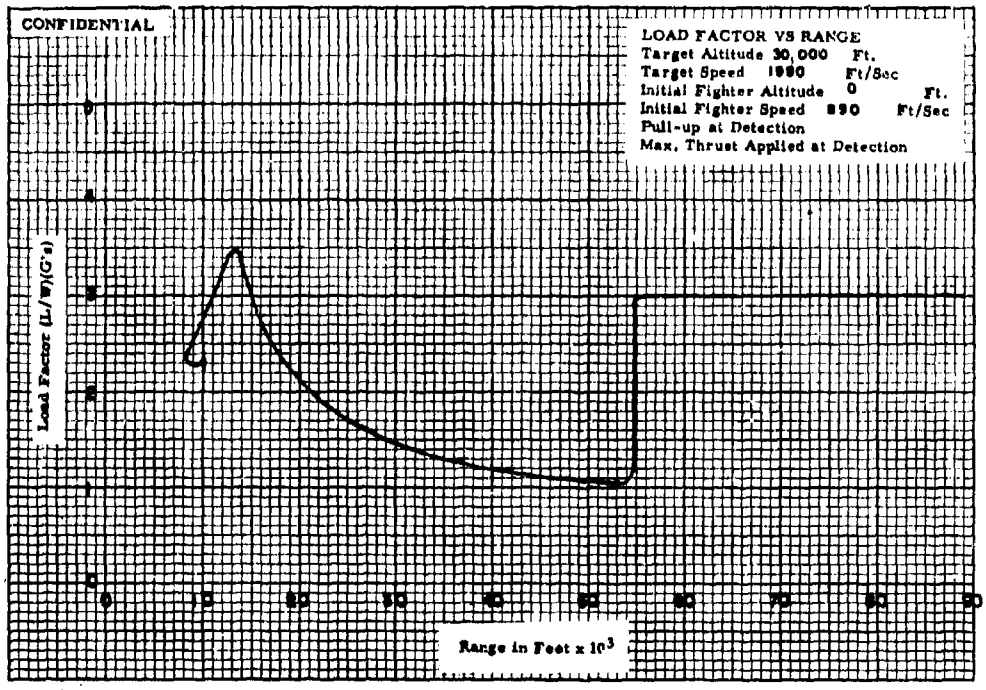


Figure 721


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

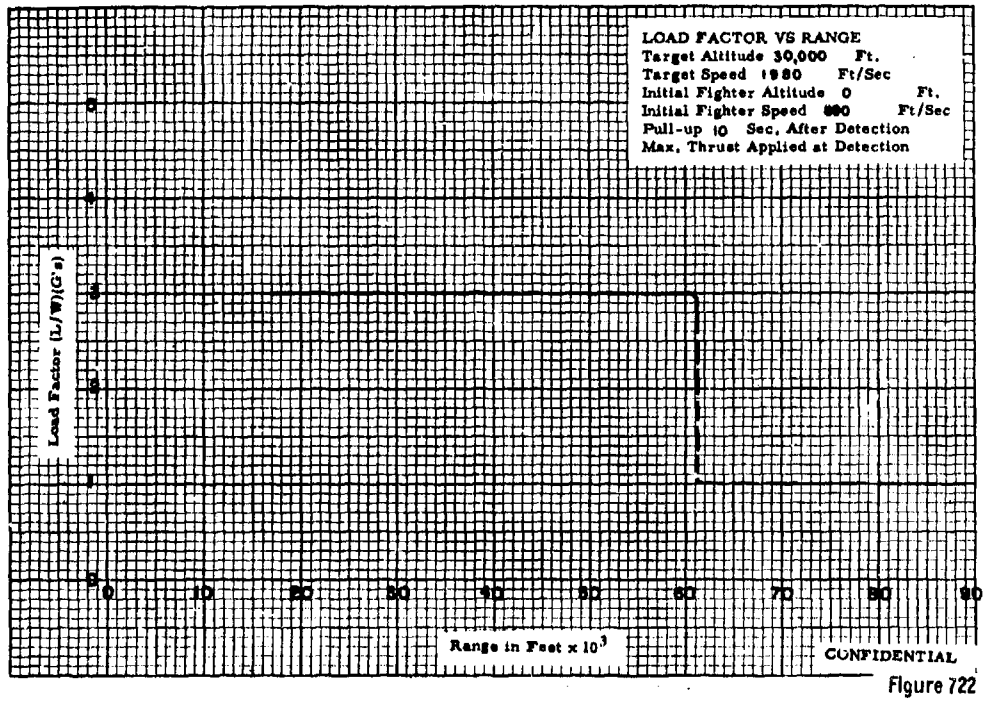

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

Figure 722

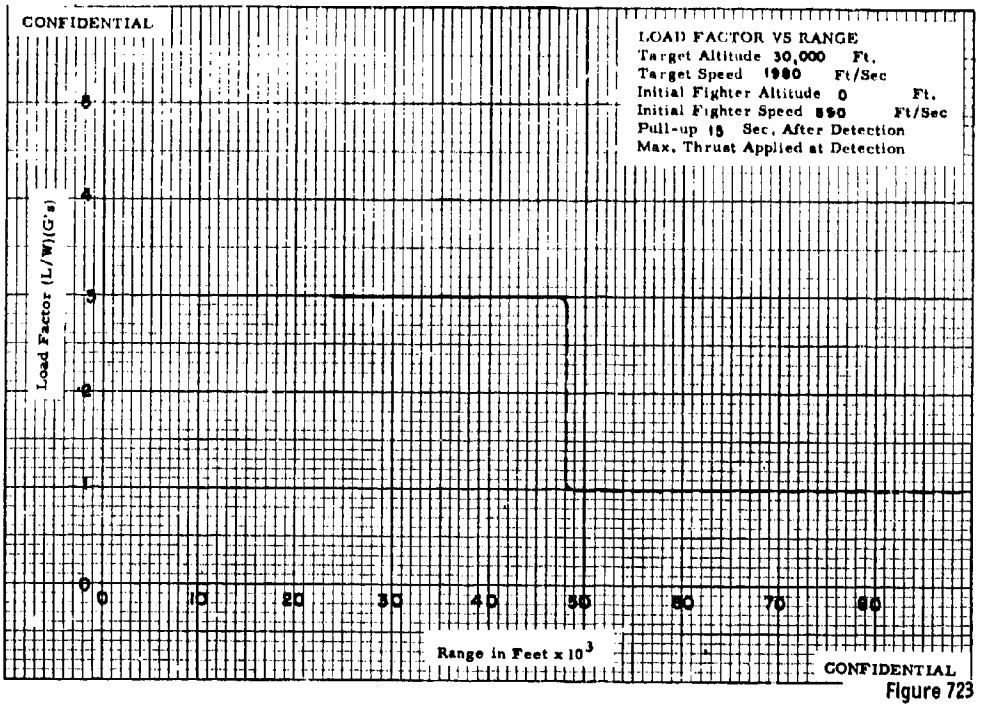


Figure 723

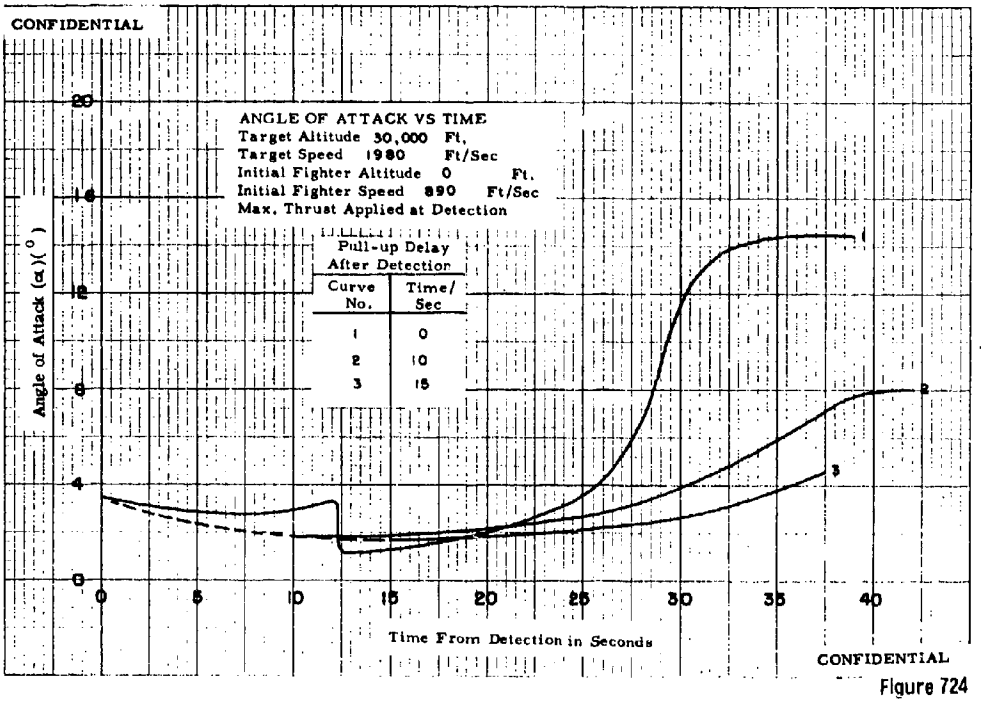


Figure 724

K&E 10 X 10 TO THE INCH KEUFFEL & ESSER CO. 359-5DG MADE IN U.S.A.

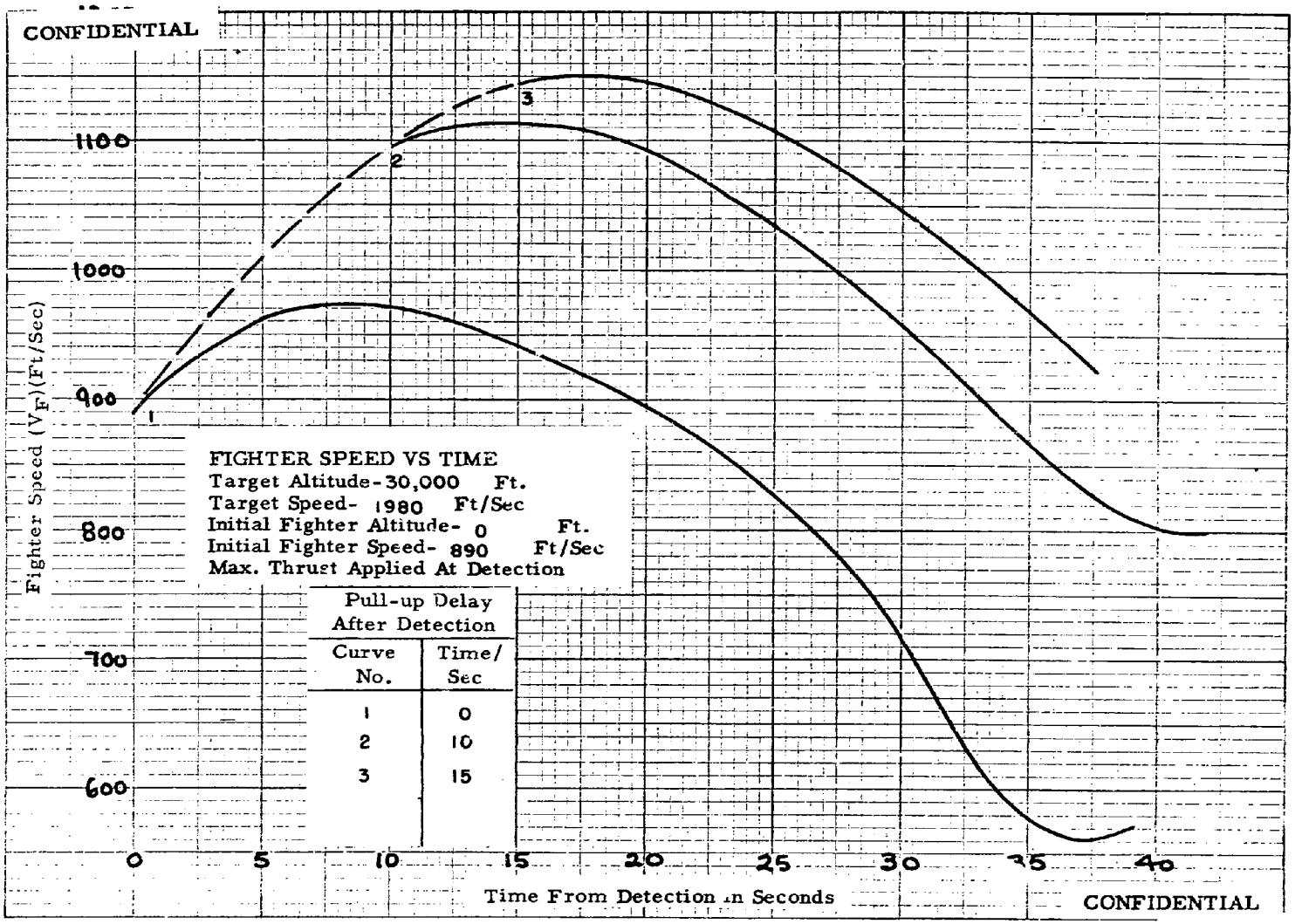
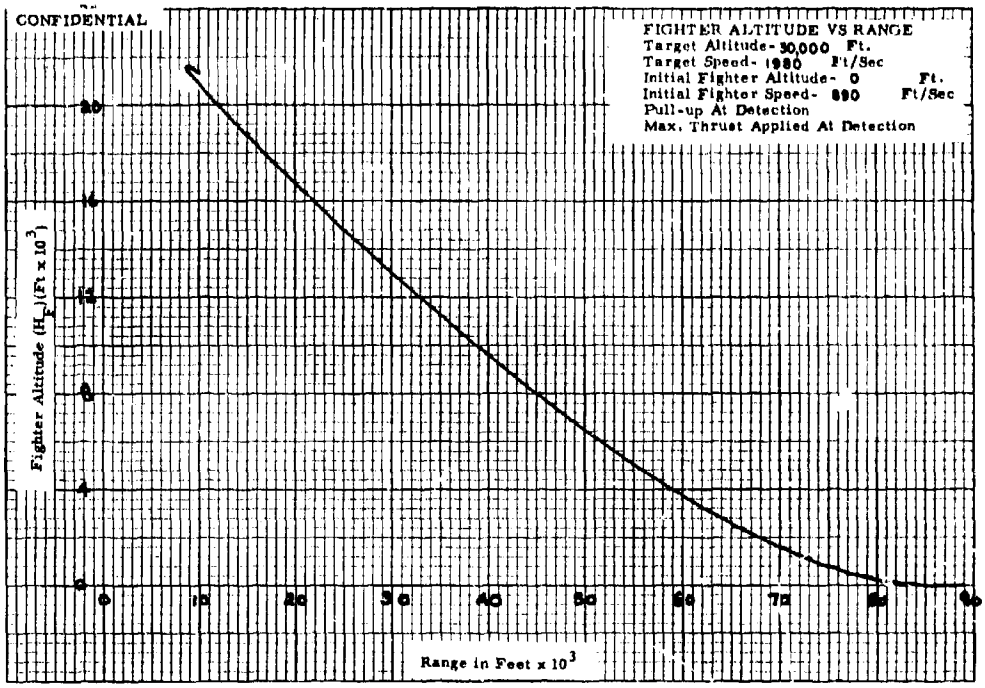


Figure 725


FIGHTER ALTITUDE VS RANGE
Target Altitude- 30,000 Ft.
Target Speed- 1980 Ft/Sec
Initial Fighter Altitude- 0 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up At Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3

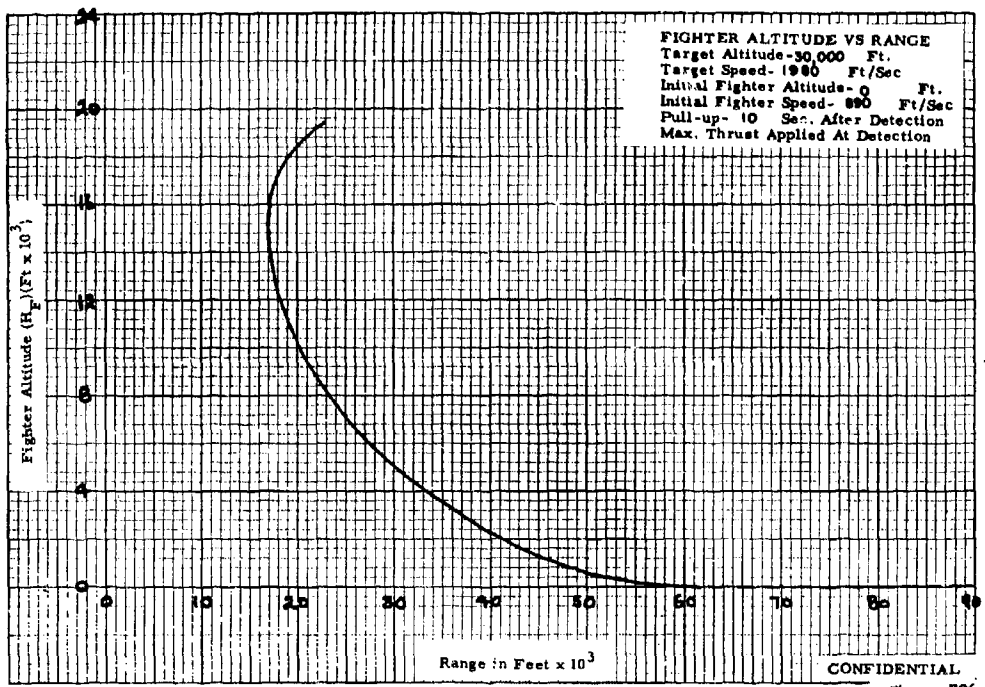
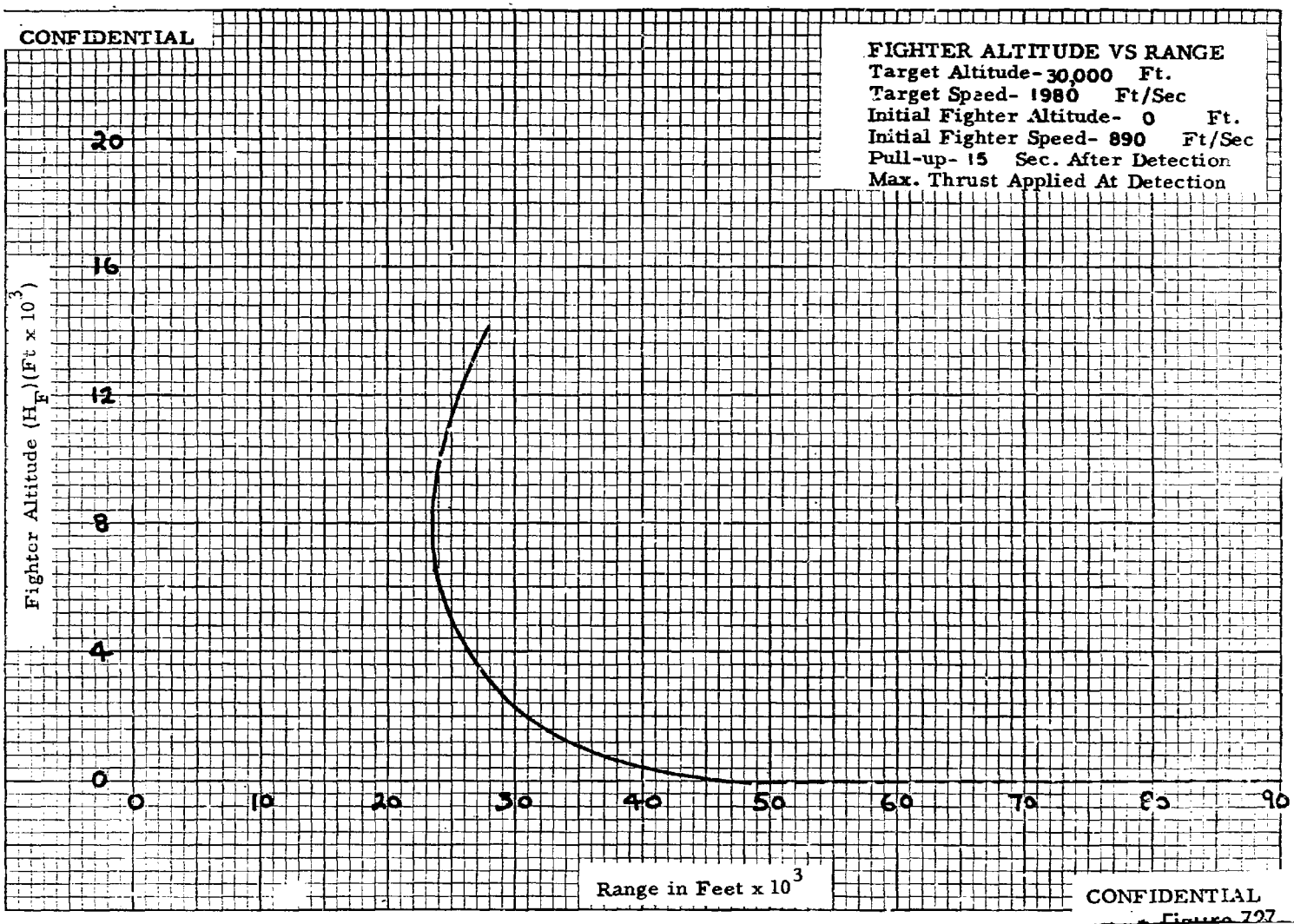

FIGHTER ALTITUDE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 1980 Ft/Sec
Initial Fighter Altitude- 0 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3

Figure 726

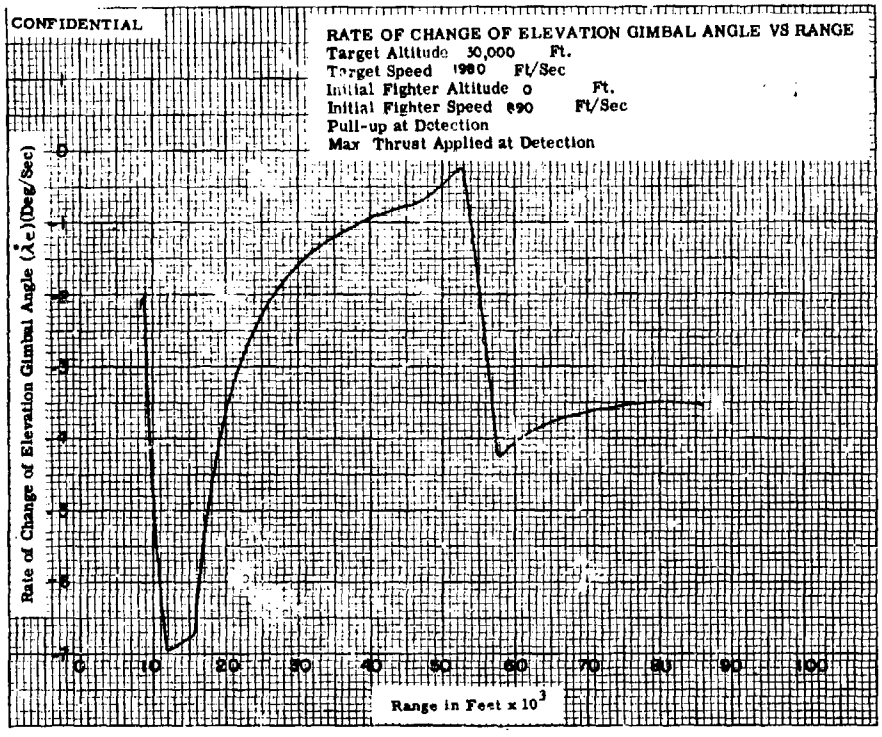
CONFIDENTIAL

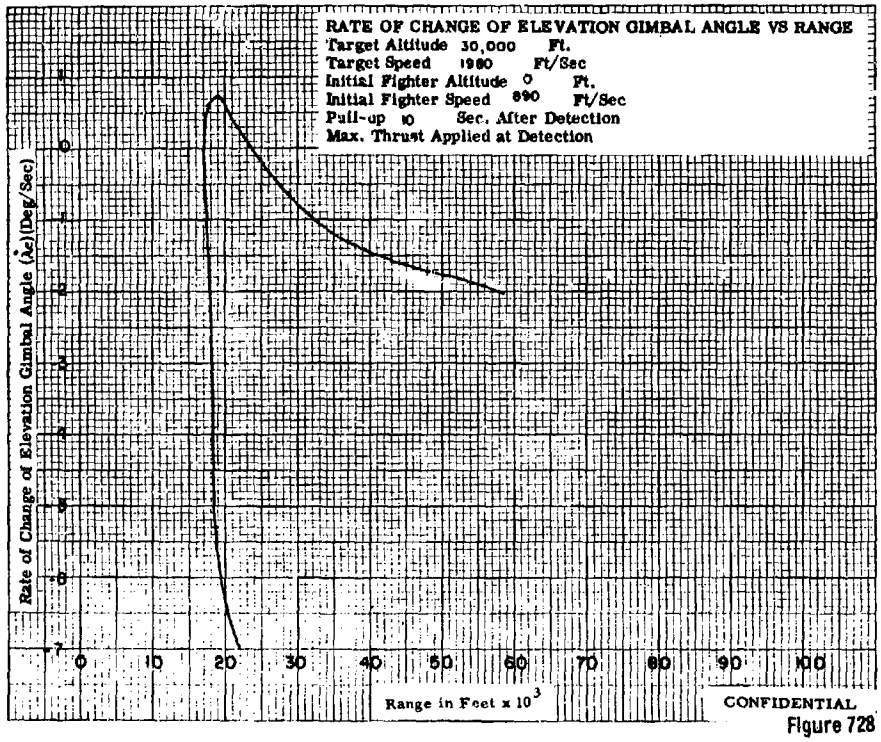


CONFIDENTIAL

Figure 727

CONFIDENTIAL

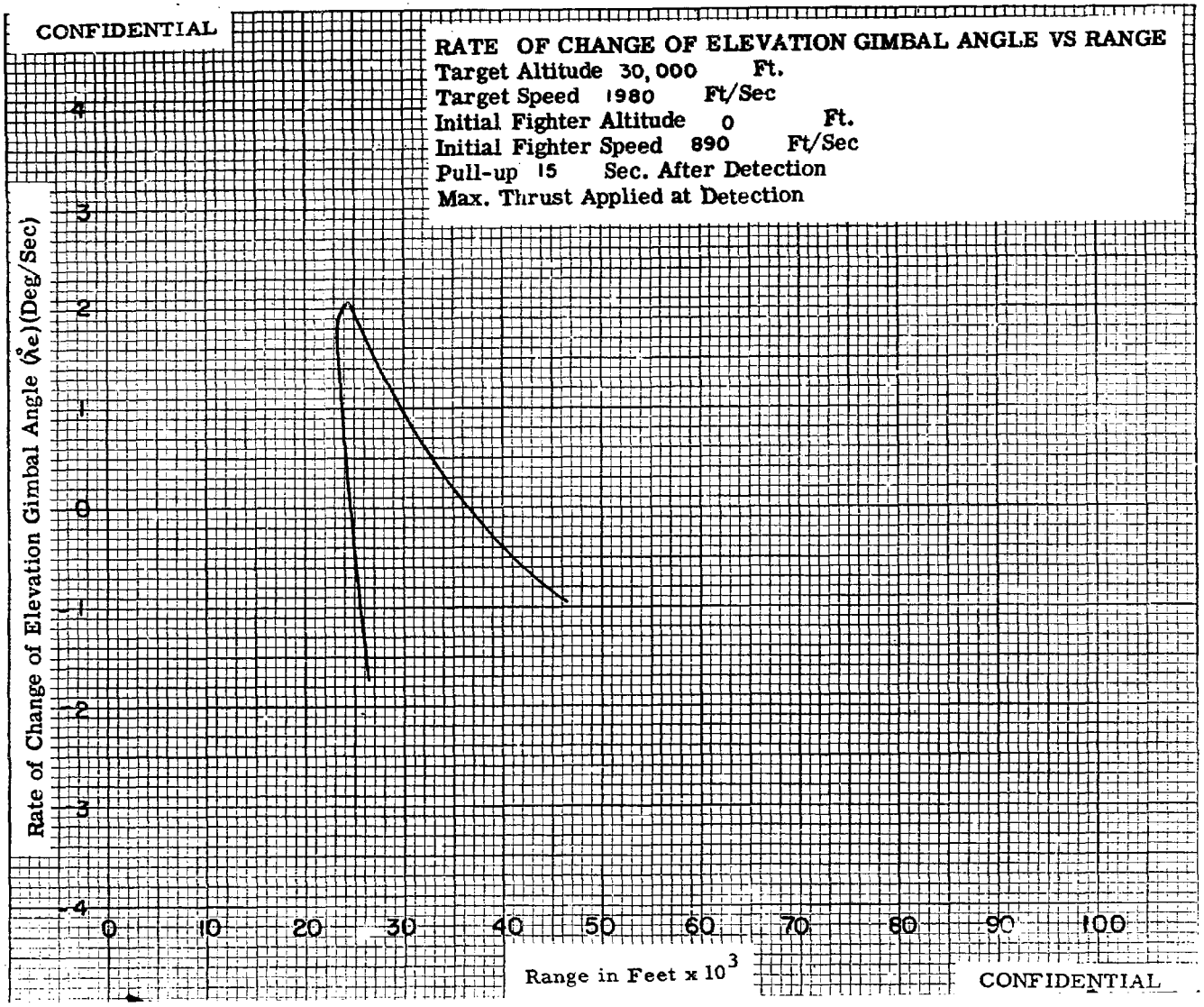




CONFIDENTIAL

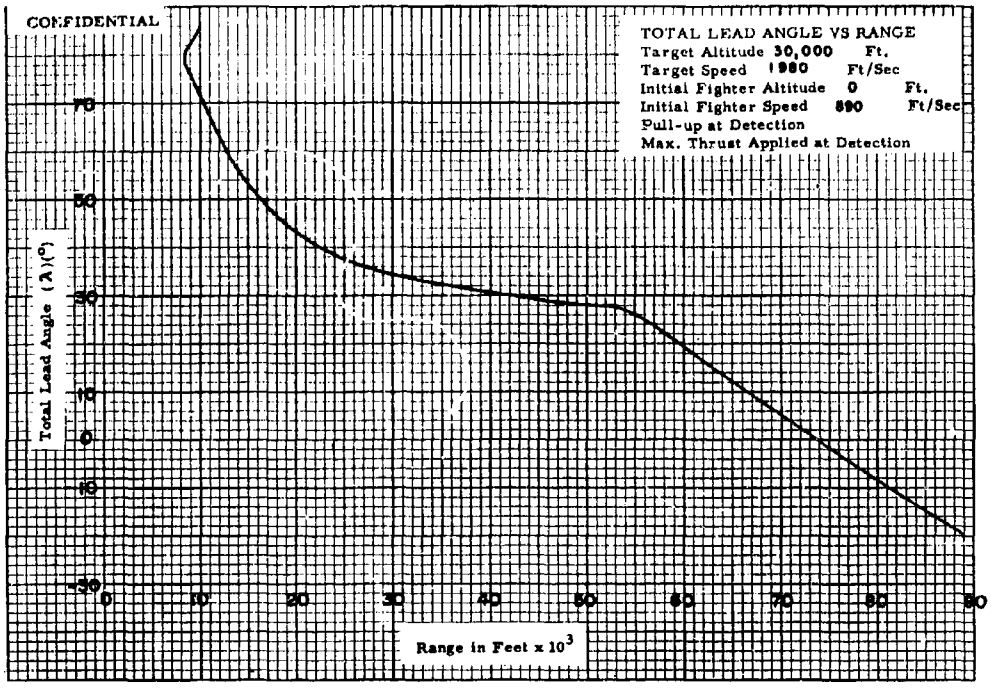
Figure 728

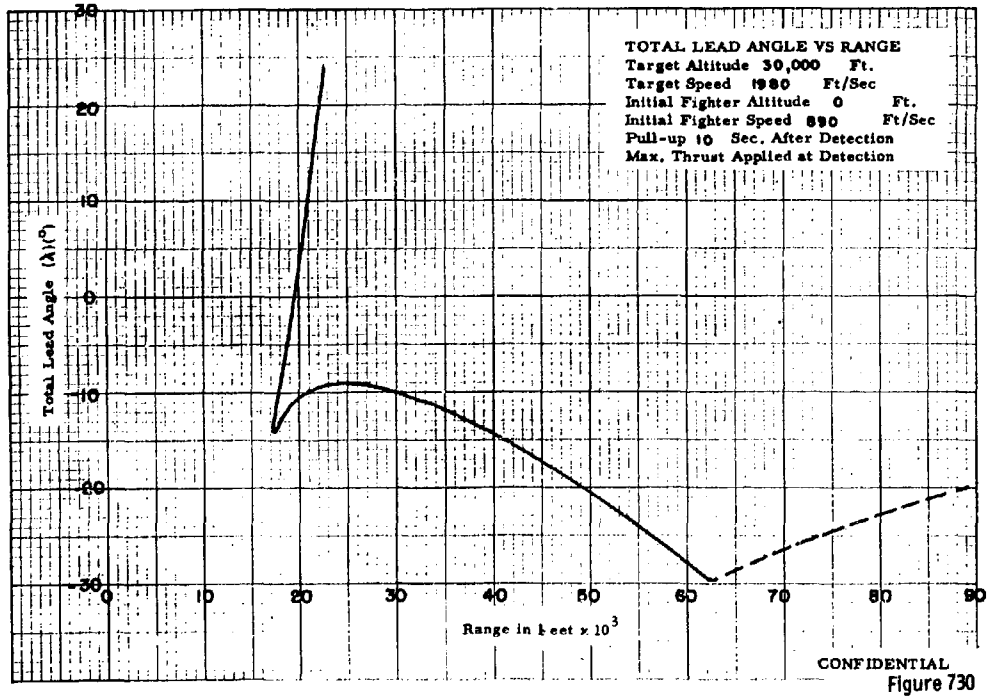
CONFIDENTIAL



CONFIDENTIAL

CONFIDENTIAL





CONFIDENTIAL

Figure 730

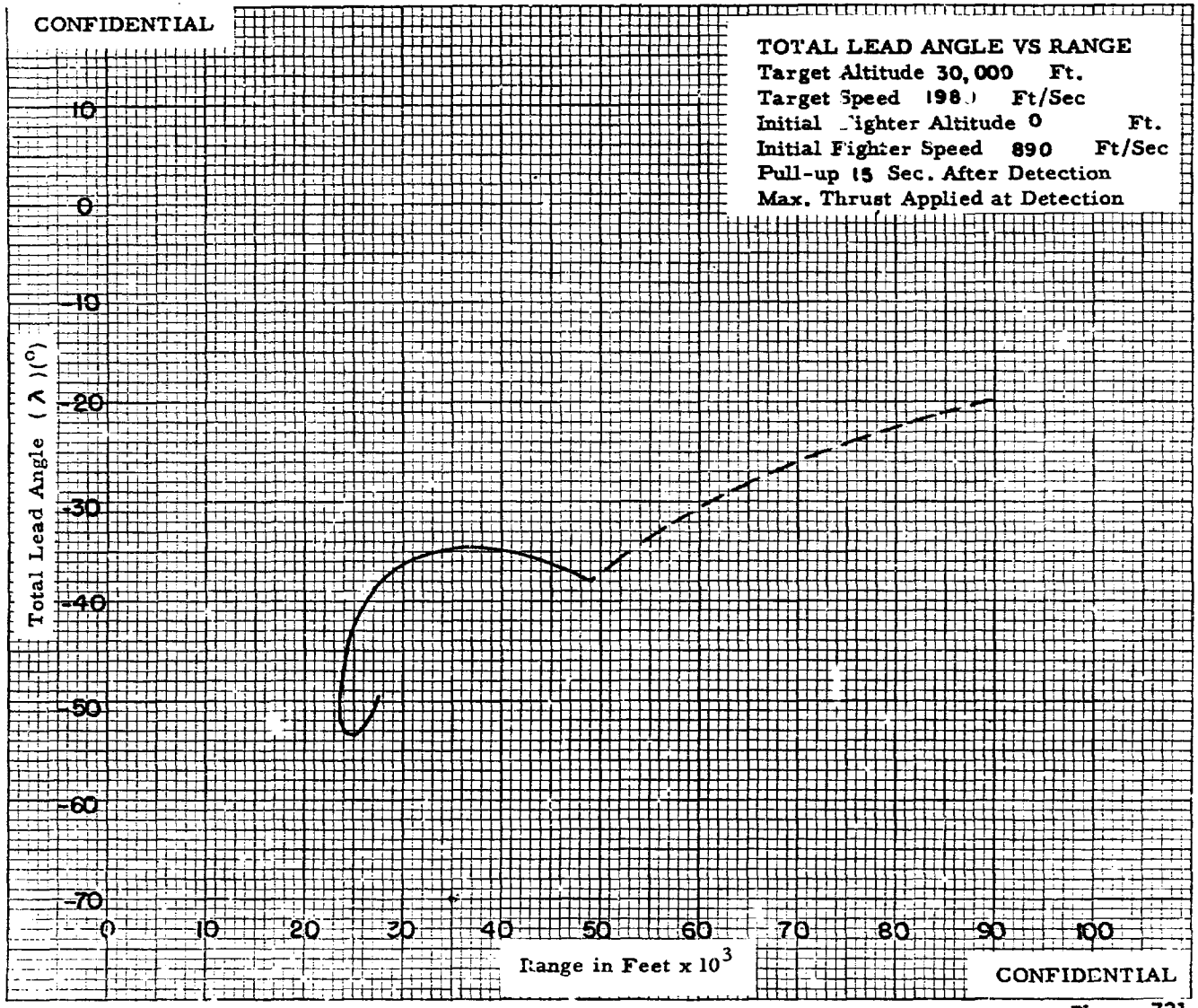
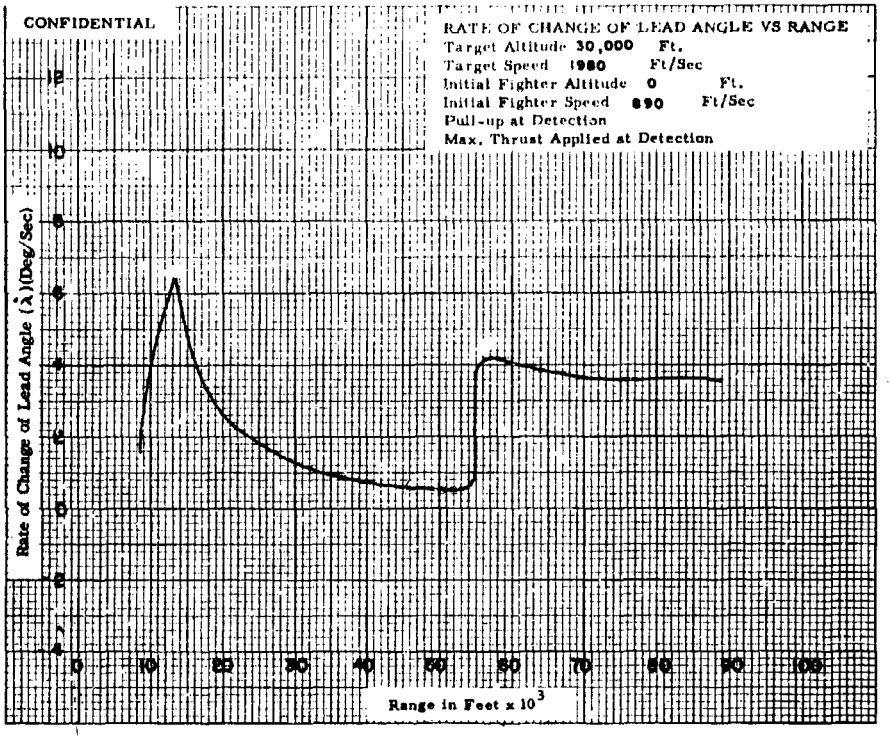

CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 15 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
10
0
-10
-20
-30
-40
-50
-60
-70
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 731


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
Range in Feet x 10^3

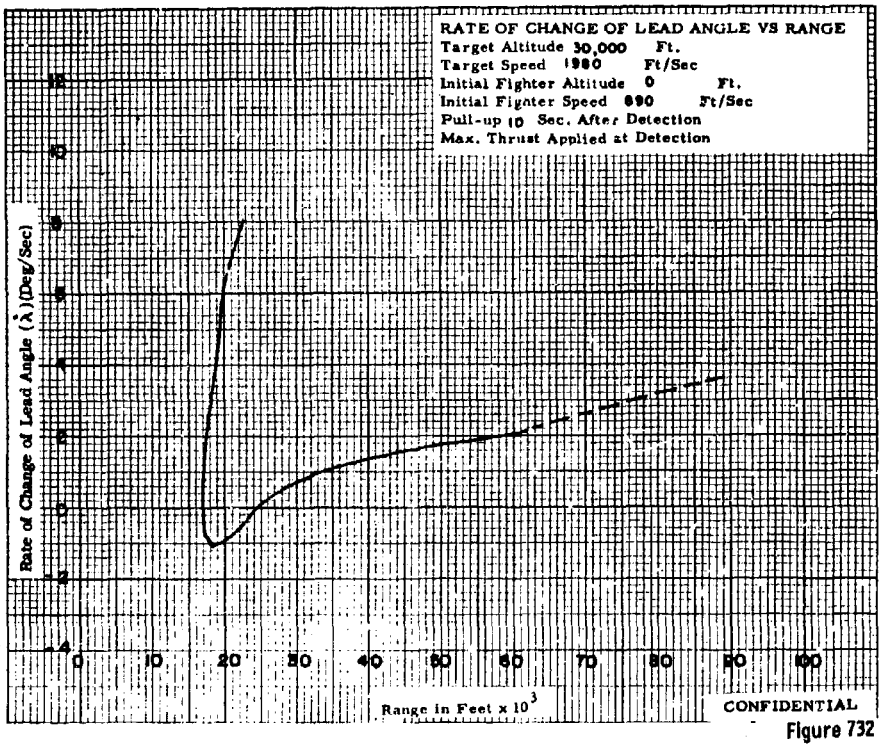

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 1980 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
Range in Feet x 10^3

Figure 732

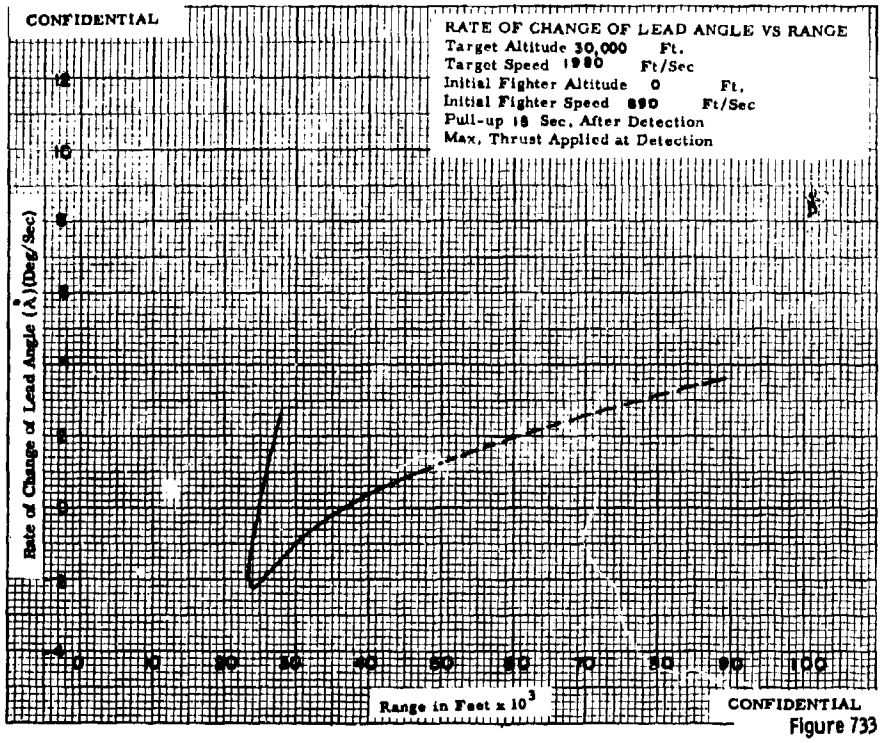


Figure 733

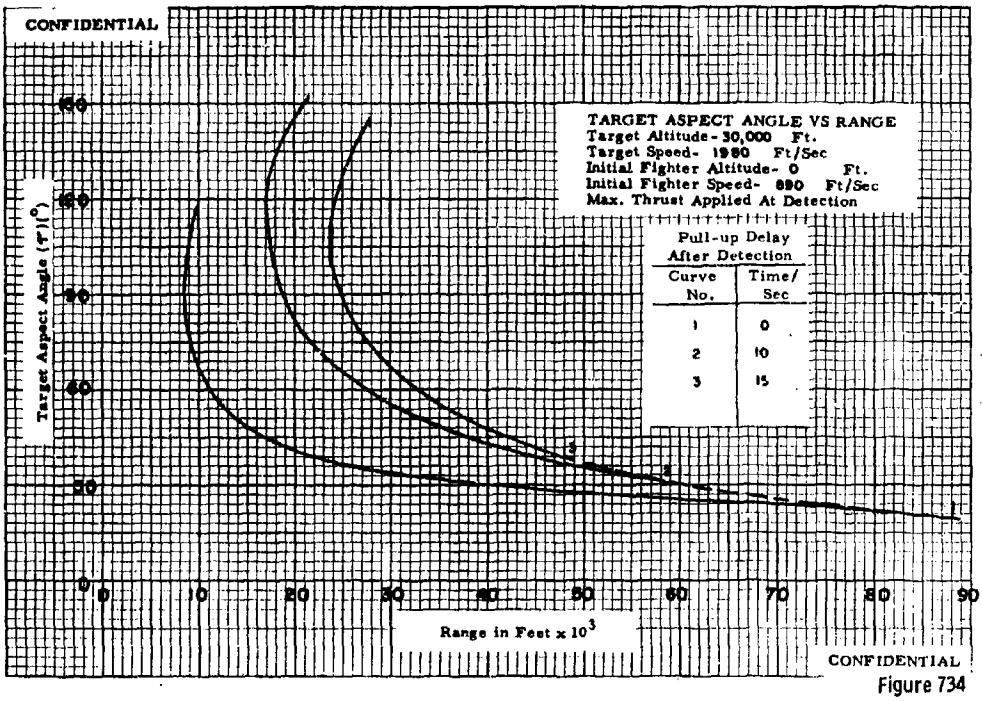
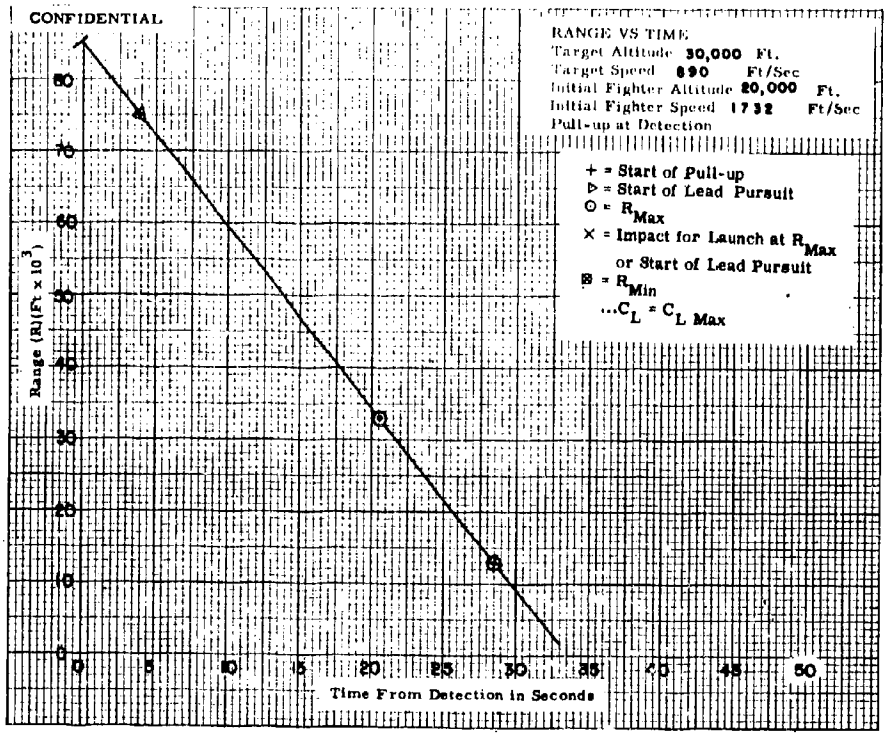


Figure 734


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

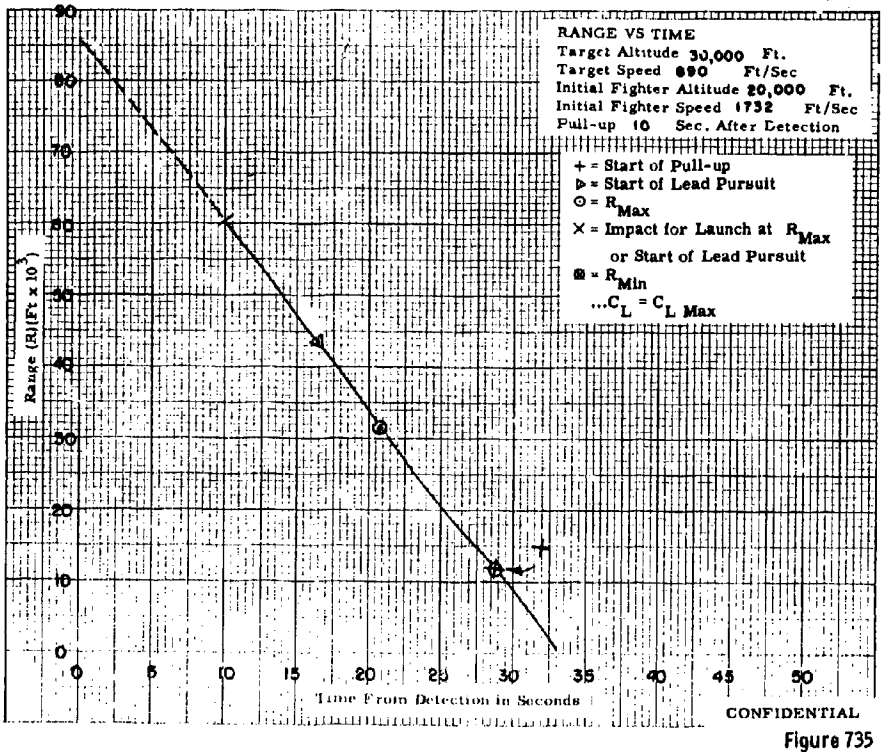
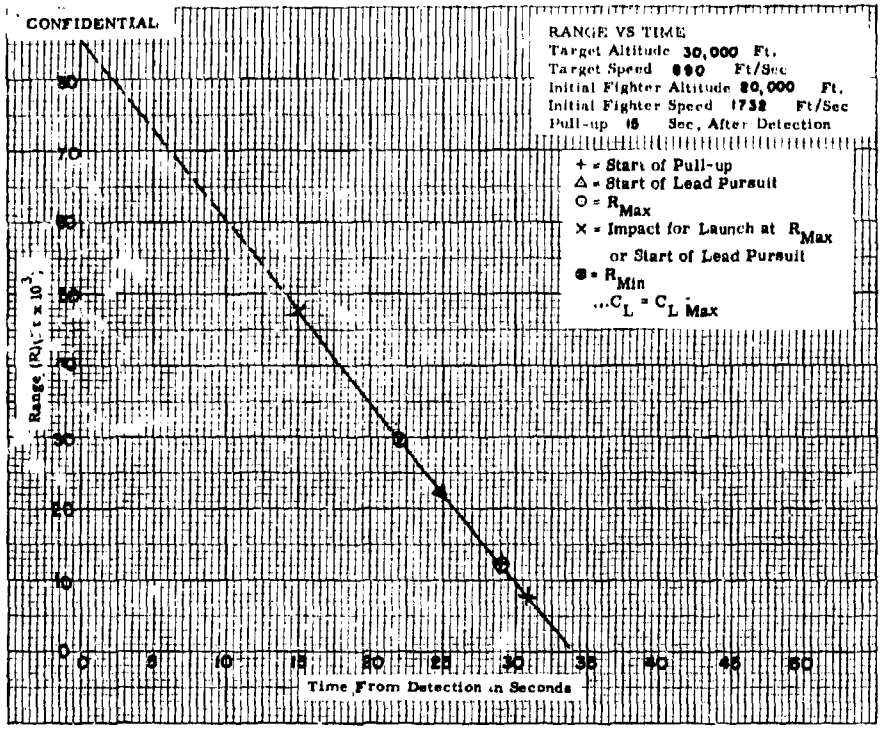

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 735


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
● = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

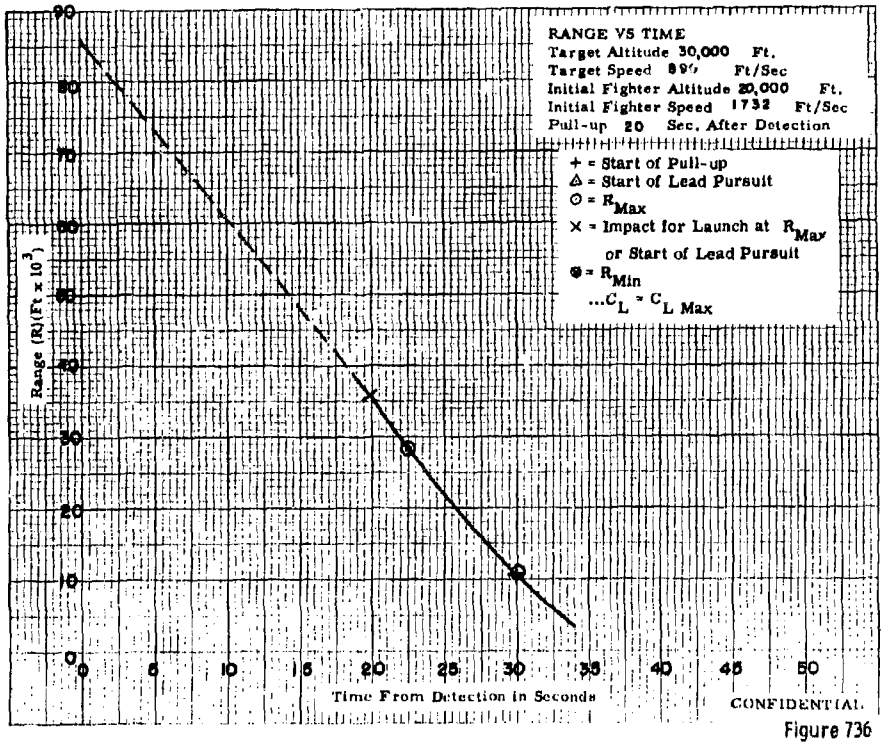
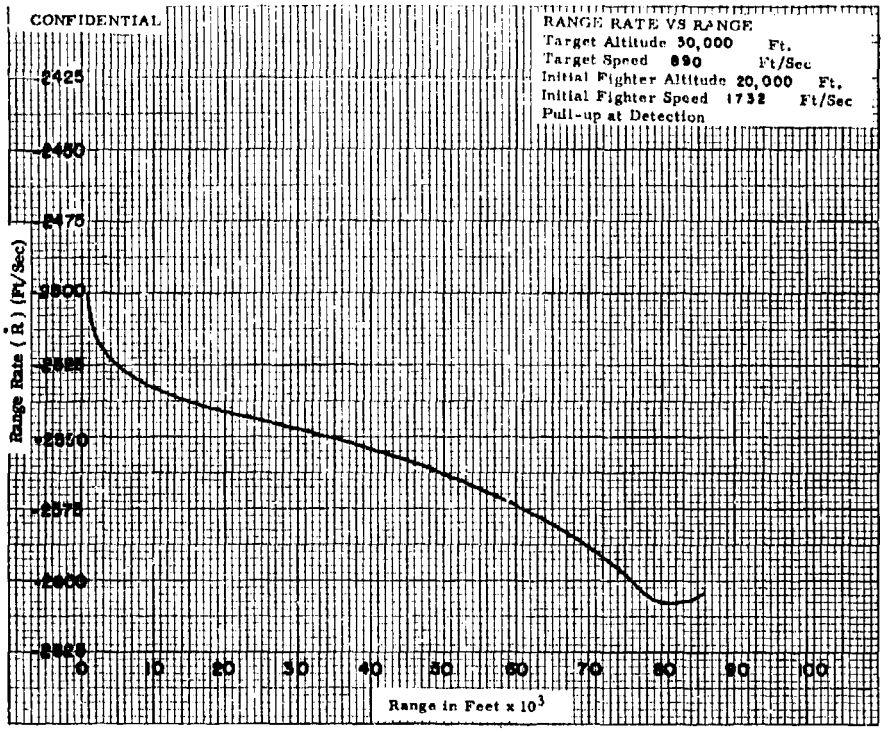

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 20 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
● = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 736


RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up at Detection
Range Rate (Ṙ) (Ft/Sec)
-2425
-2450
-2475
-2500
-2525
-2550
-2575
-2600
-2625
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

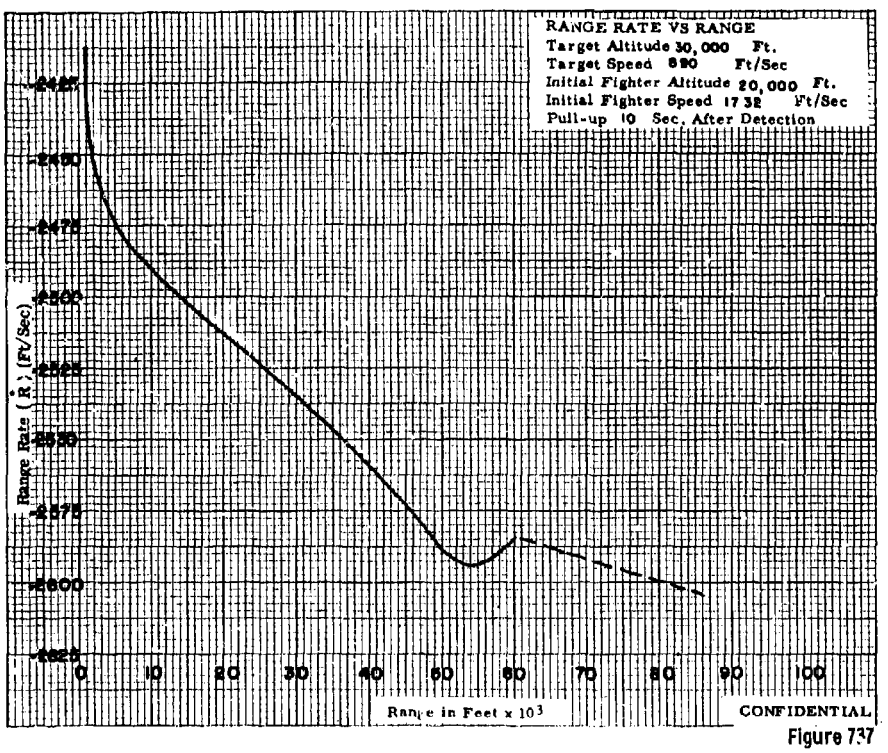
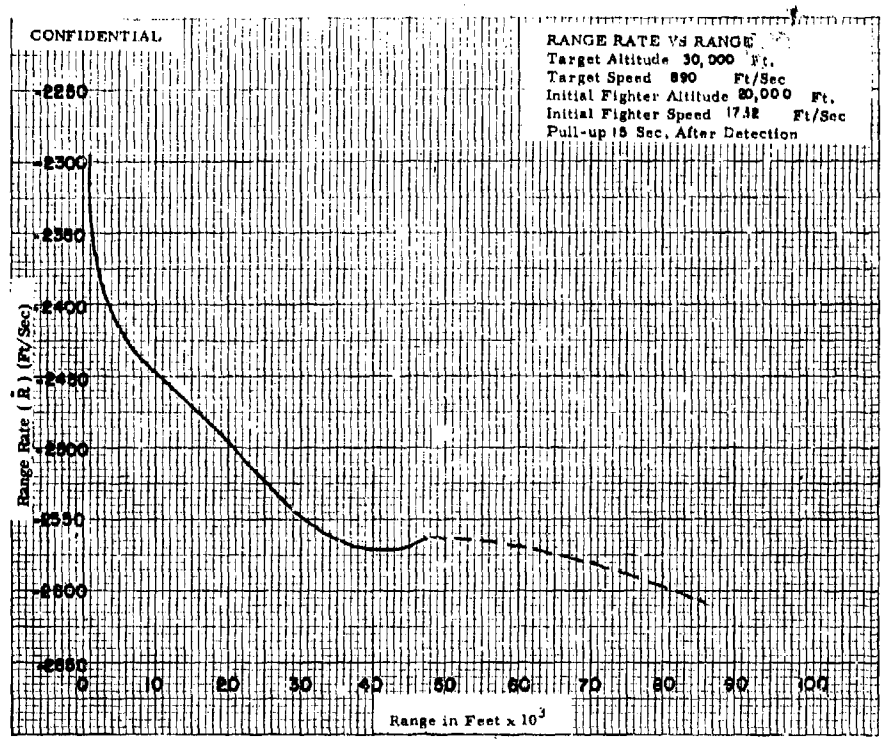

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
-2425
-2450
-2475
-2500
-2525
-2550
-2575
-2600
-2625
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 737


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
-2250
-2300
-2350
-2400
-2450
-2500
-2550
-2600
-2650
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

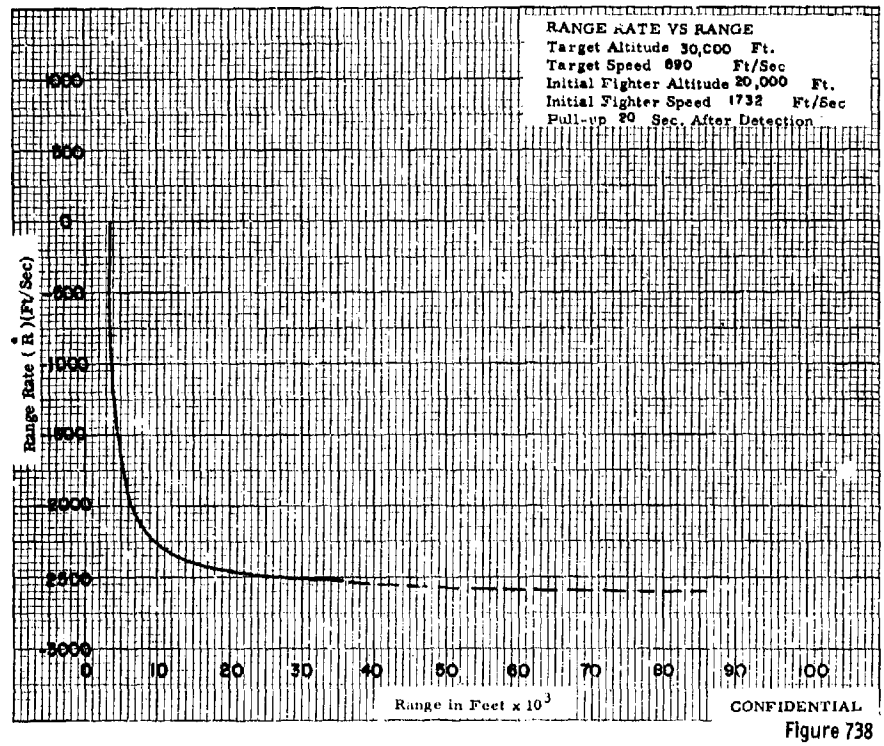

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 20 Sec. After Detection
Range Rate (Ṙ)(Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 738

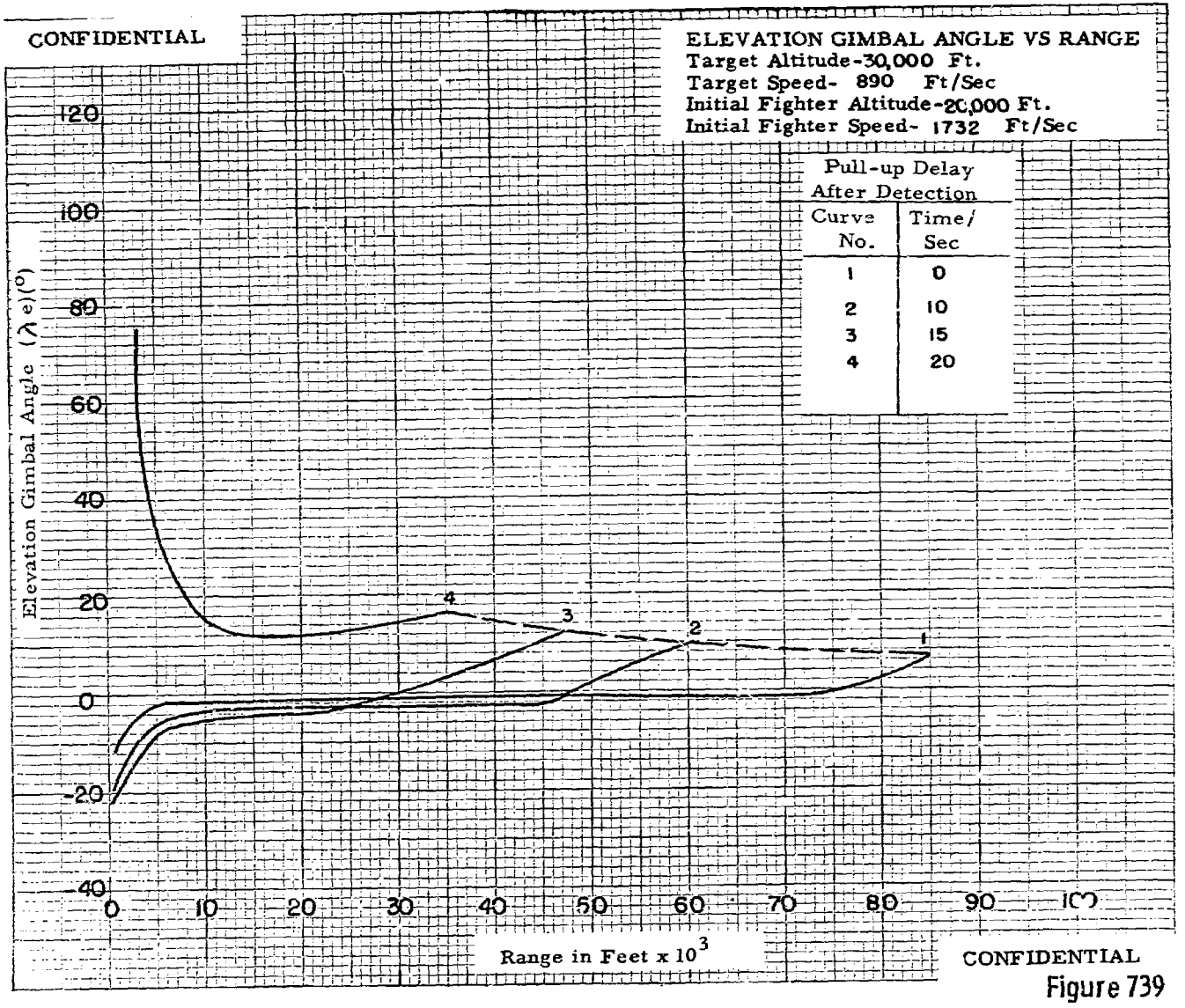
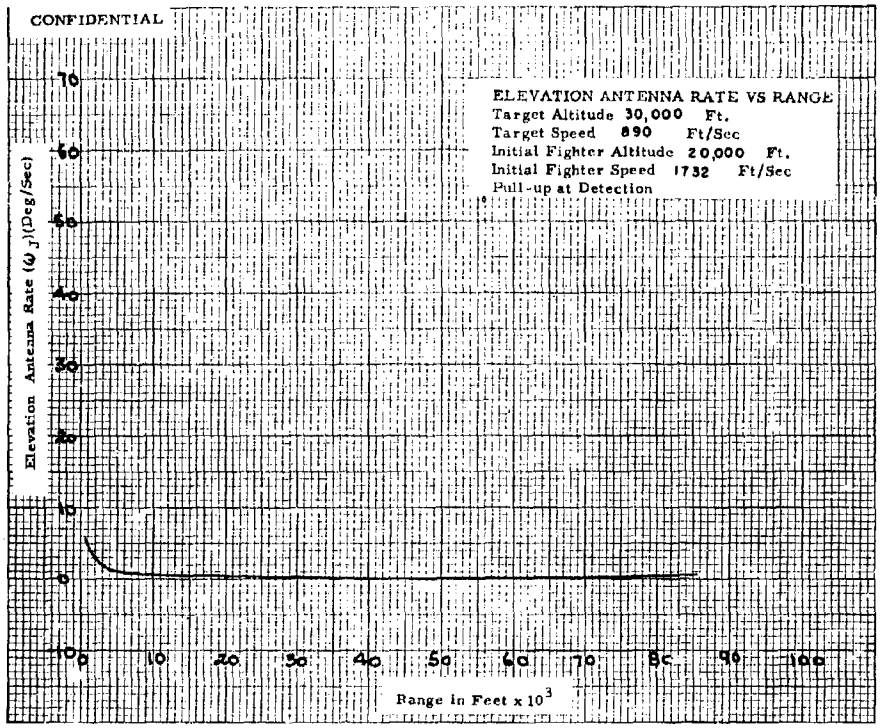
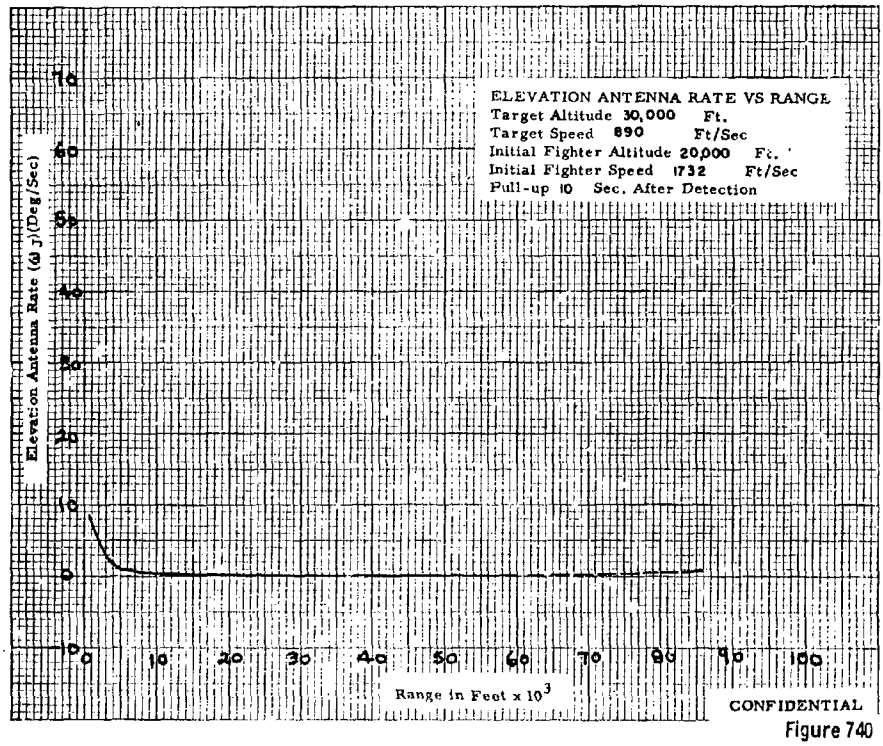

CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 890 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1732 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 15
4 | 20
Elevation Gimbal Angle (λe)(°)
120
100
80
60
40
20
0
-20
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 739

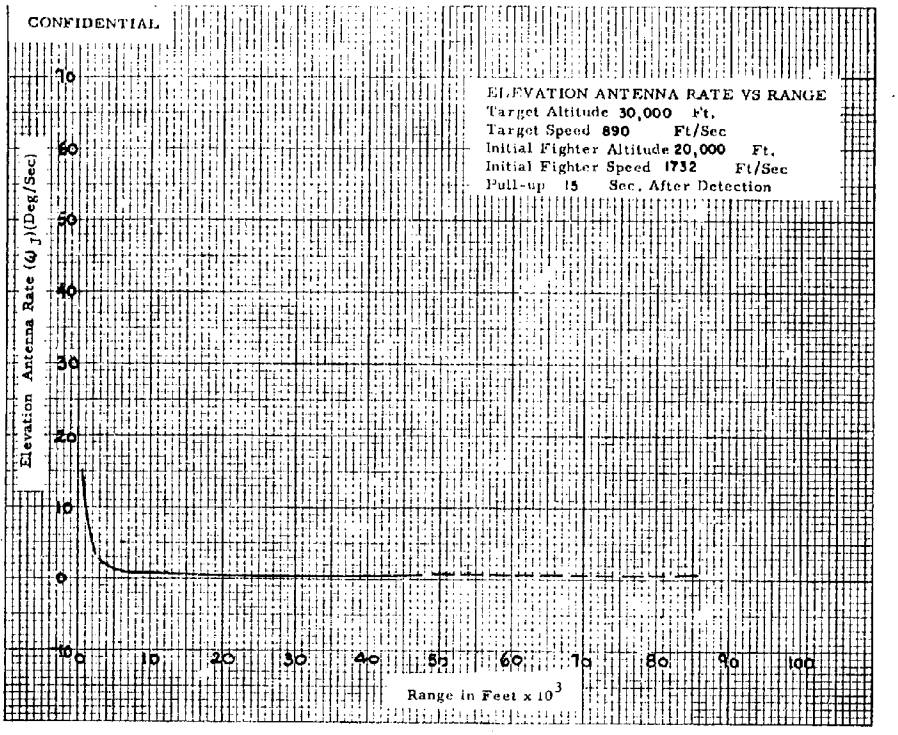
CONFIDENTIAL





CONFIDENTIAL

Figure 740


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Elevation Antenna Rate (ω_f)(Deg/Sec)
70
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

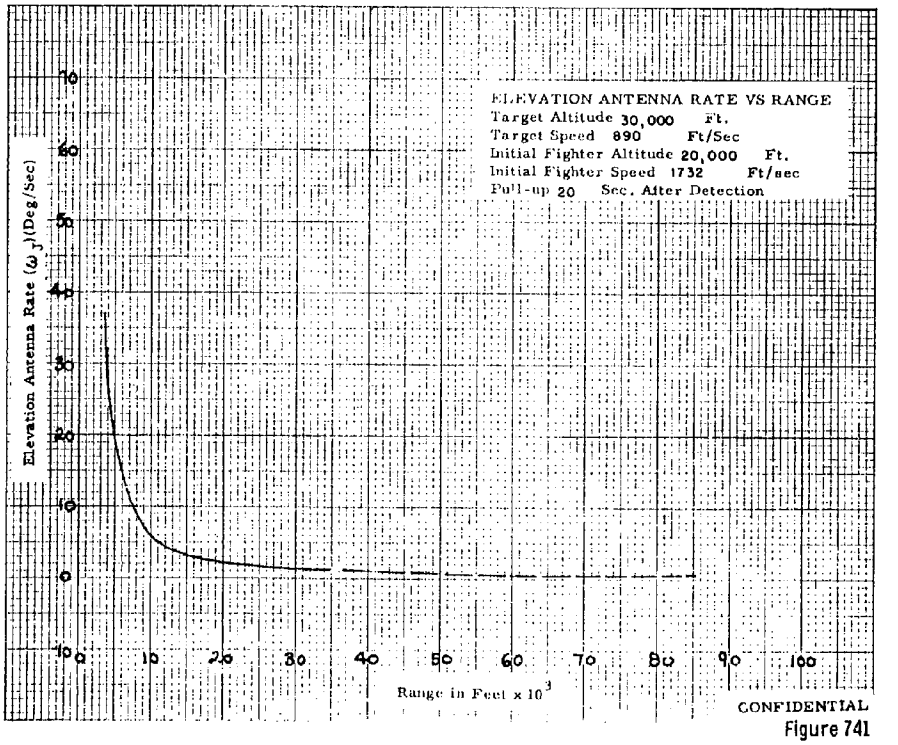

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/sec
Pull-up 20 Sec. After Detection
Elevation Antenna Rate (ω_f)(Deg/Sec)
70
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 741

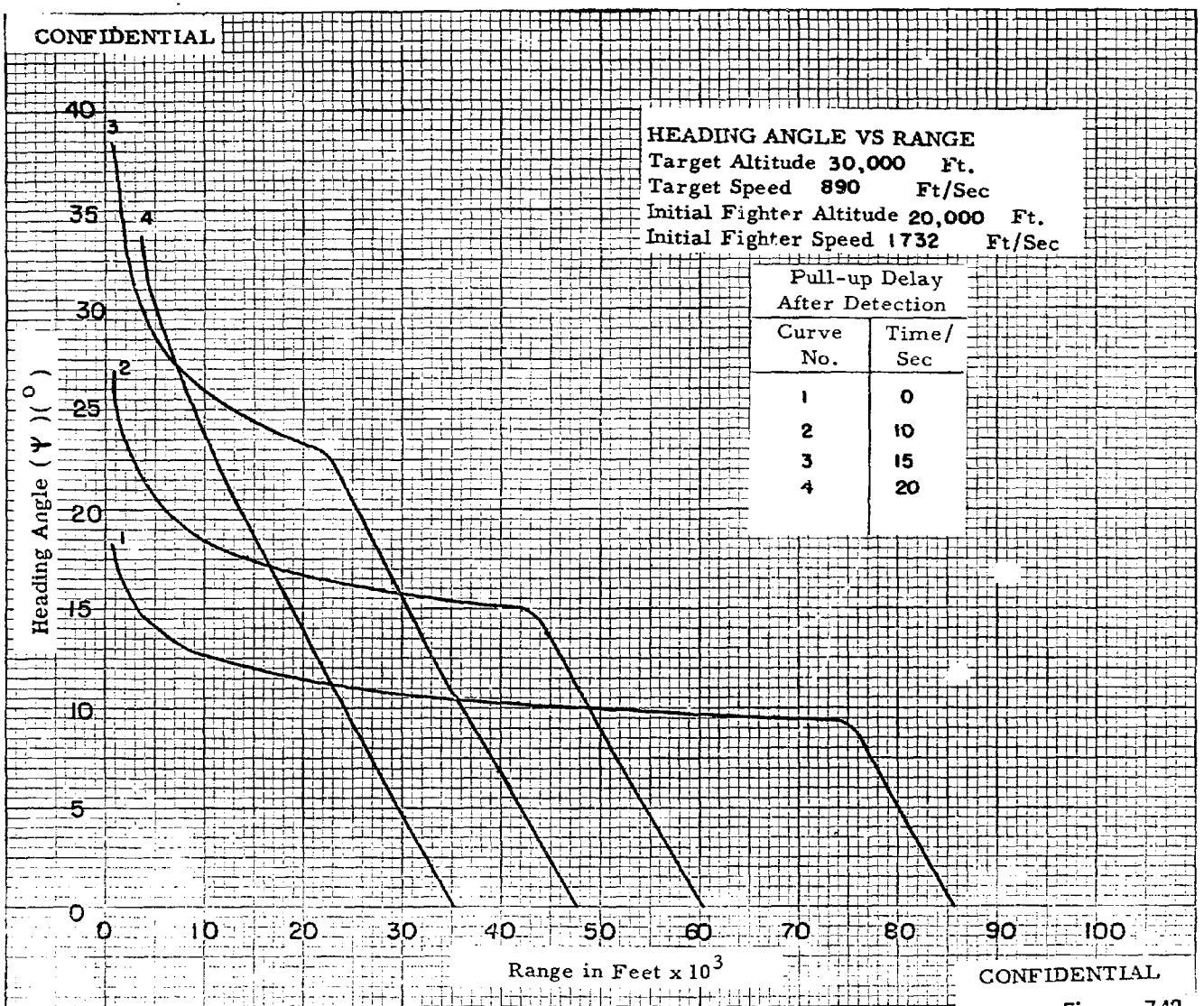
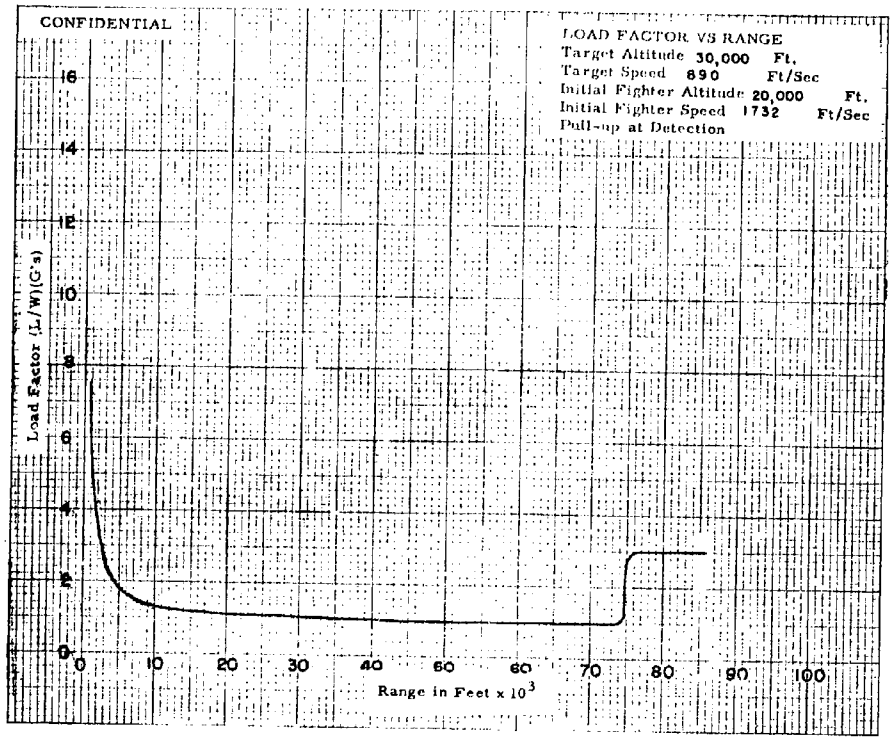

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
3 | 15
4 | 20
Heading Angle (Ψ)(°)
Range in Feet x 10^3
0
5
10
15
20
25
30
35
40
0
10
20
30
40
50
60
70
80
90
100
1
2
3
4
CONFIDENTIAL

Figure 742


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

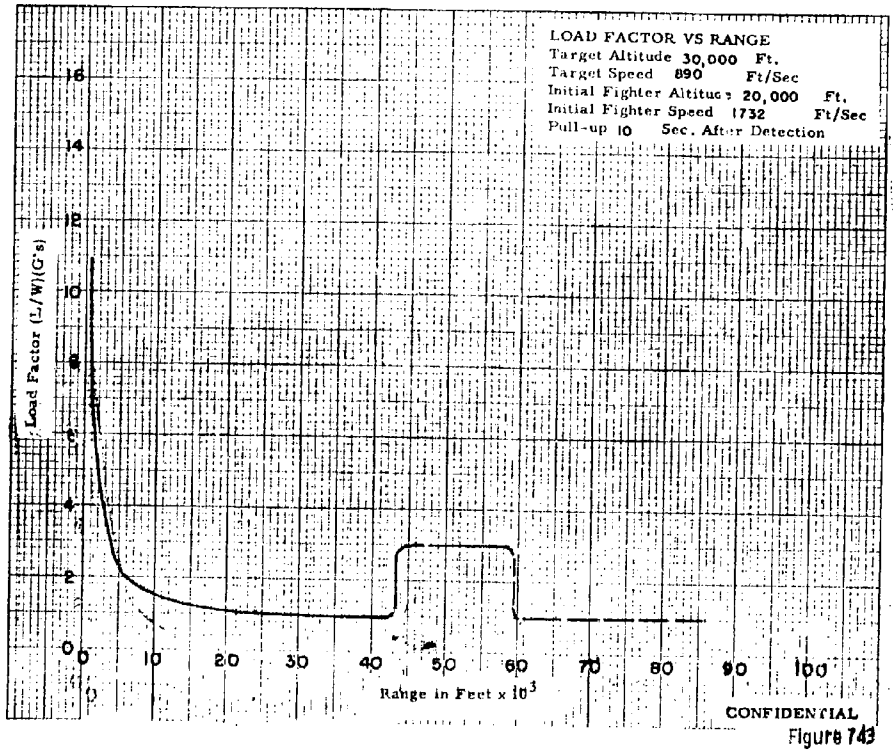
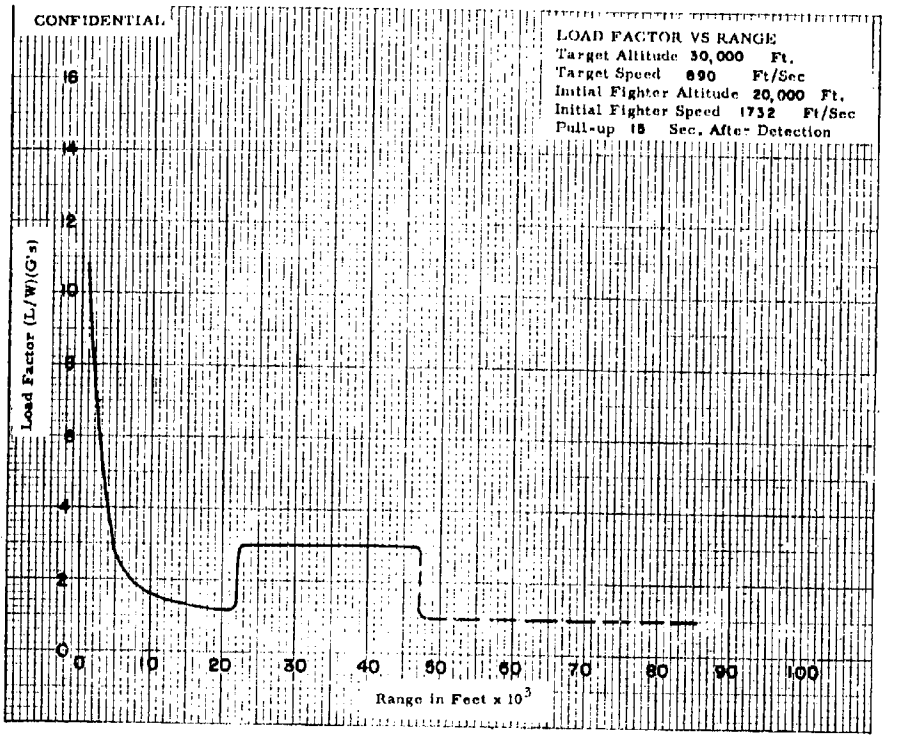

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

Figure 743


LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

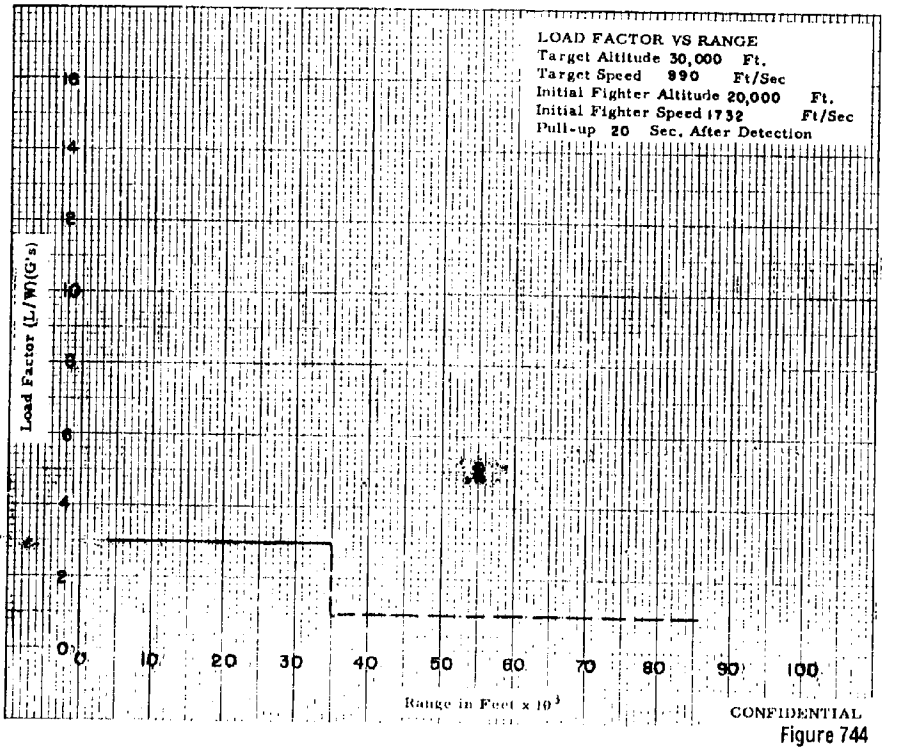
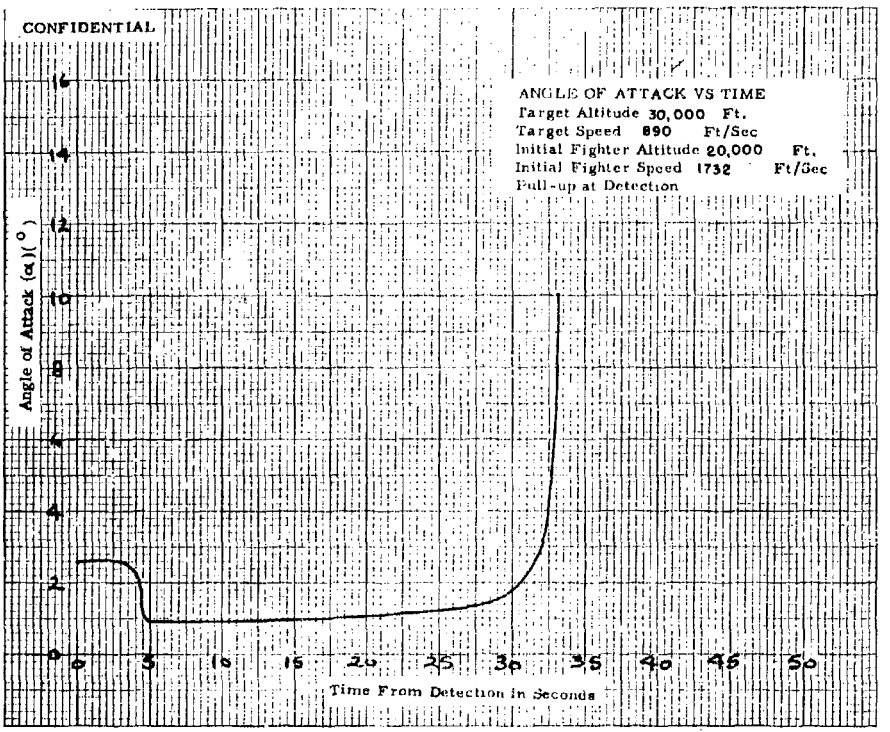

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 990 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 20 Sec. After Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

Figure 744


CONFIDENTIAL
ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up at Detection
Angle of Attack (α)(°)
0 2 4 6 8 10 12 14 16
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds

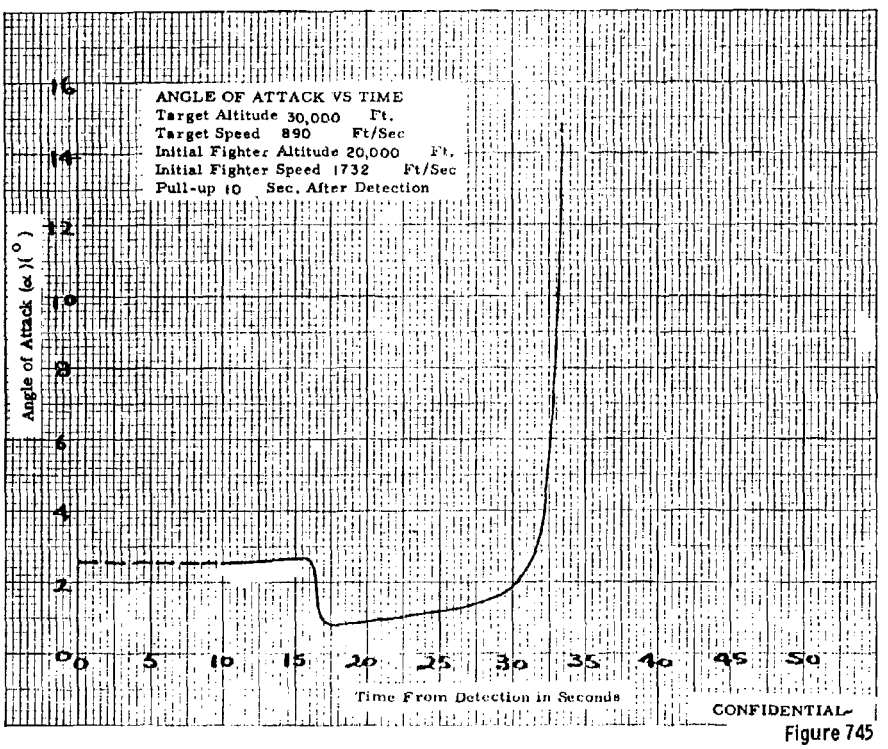
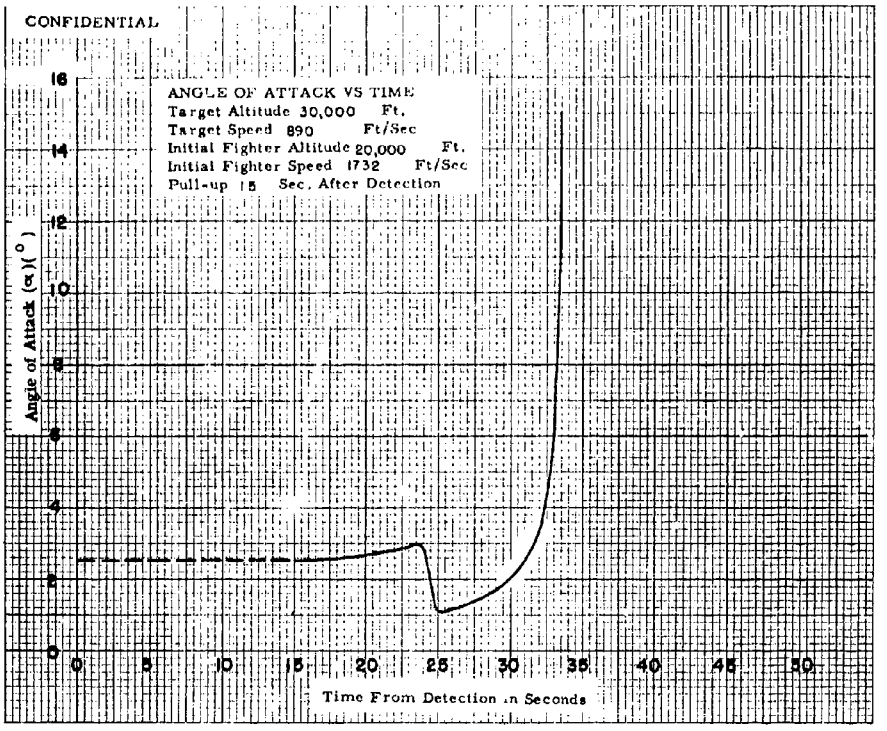
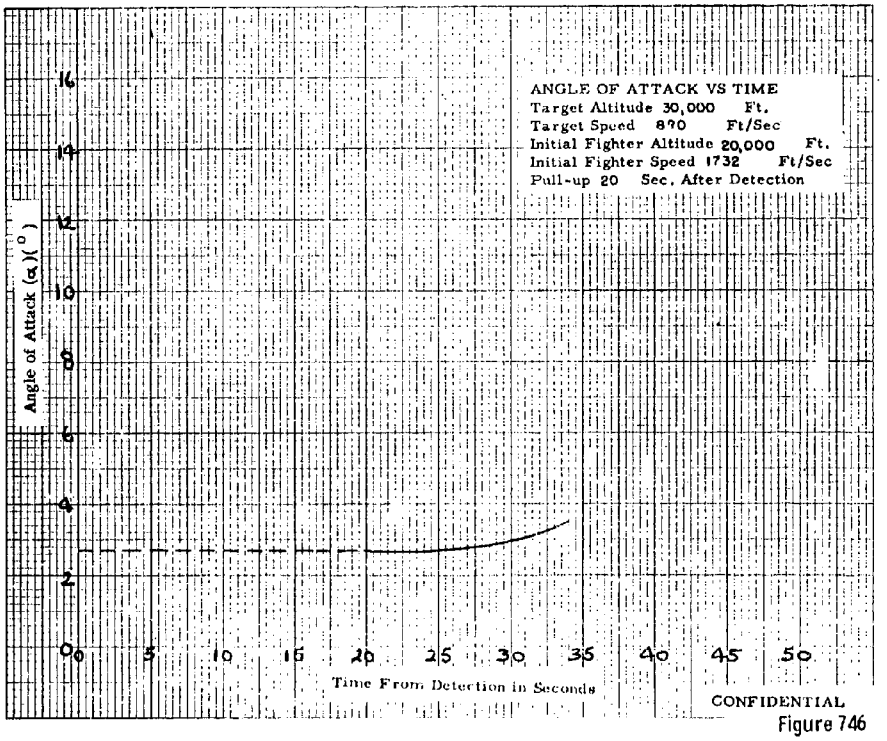

ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 10 Sec. After Detection
Angle of Attack (α)(°)
0 2 4 6 8 10 12 14 16
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds
CONFIDENTIAL

Figure 745

CONFIDENTIAL





CONFIDENTIAL

Figure 746

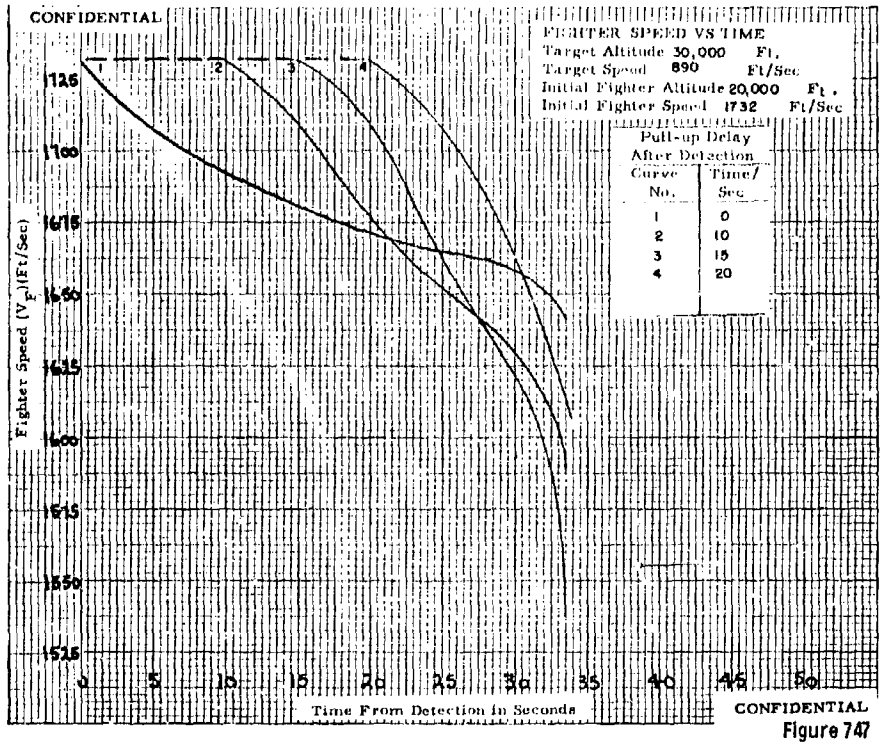


Figure 747

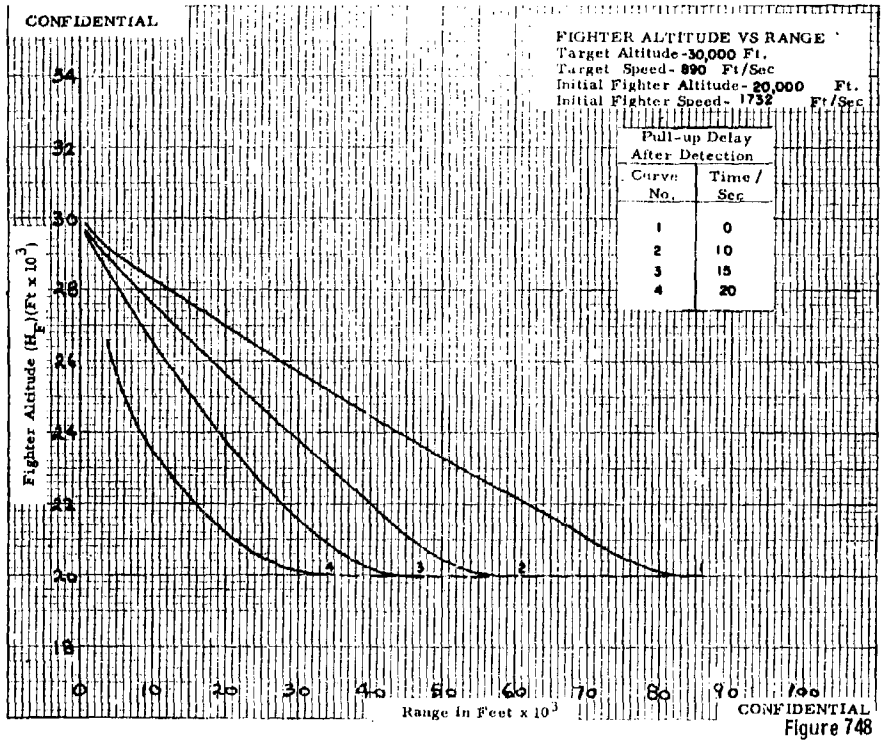
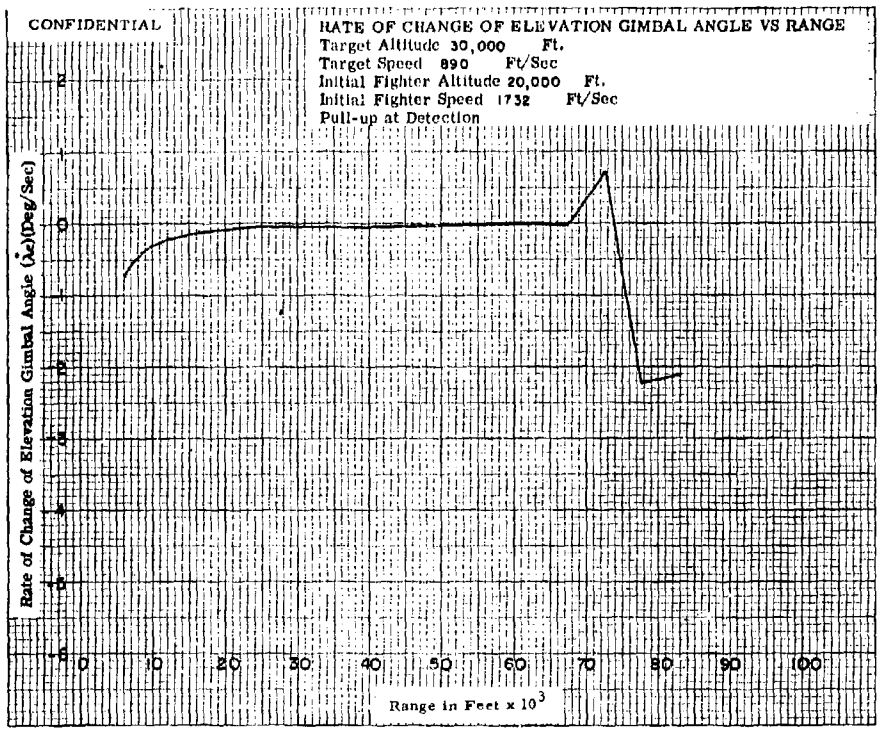
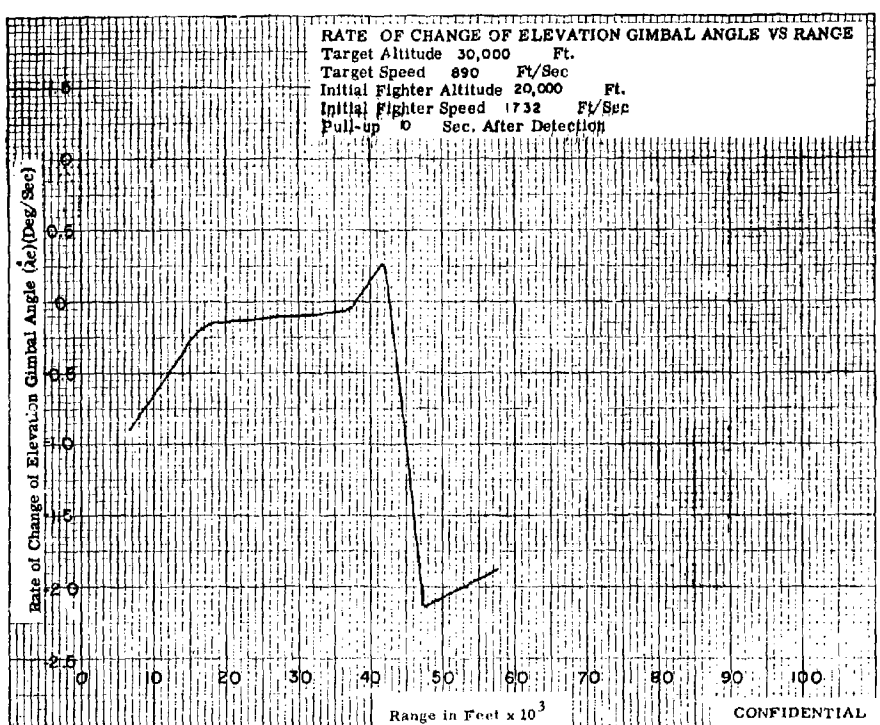


Figure 748

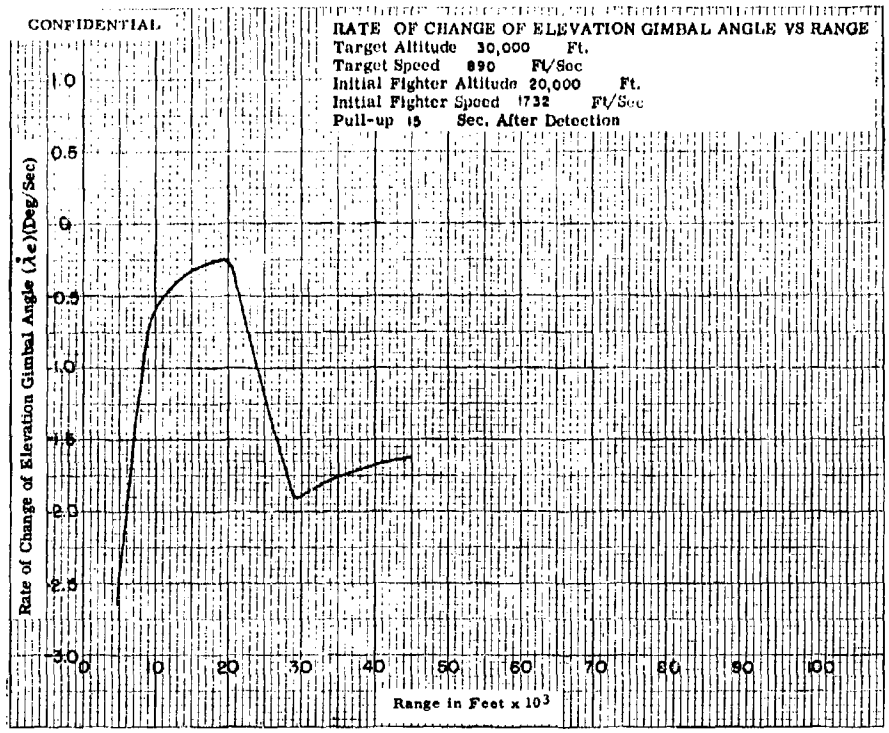
CONFIDENTIAL





CONFIDENTIAL

Figure 749


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
1.0
0.5
0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

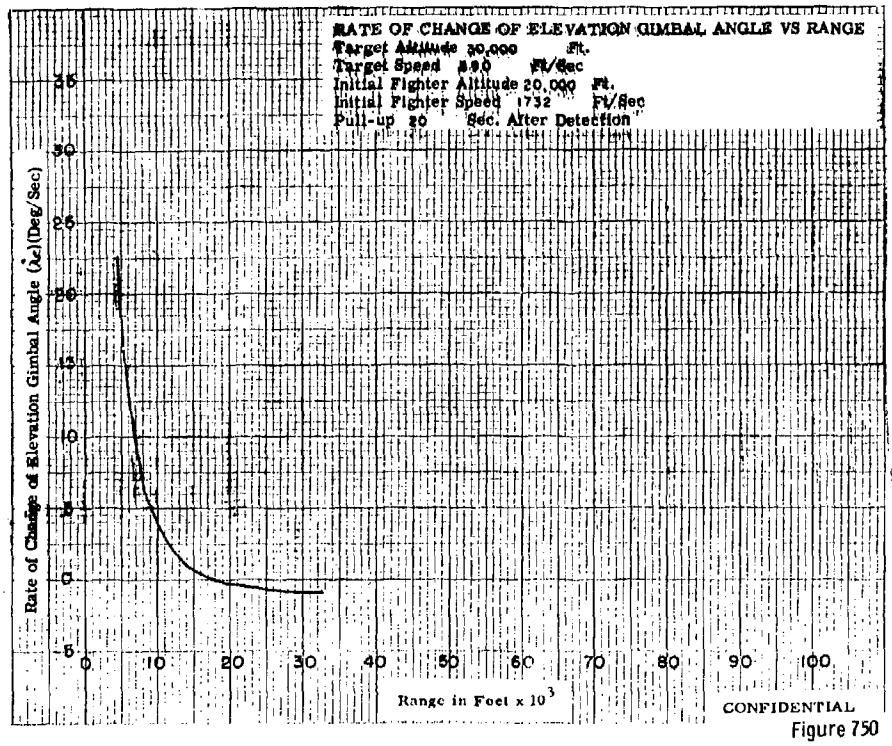
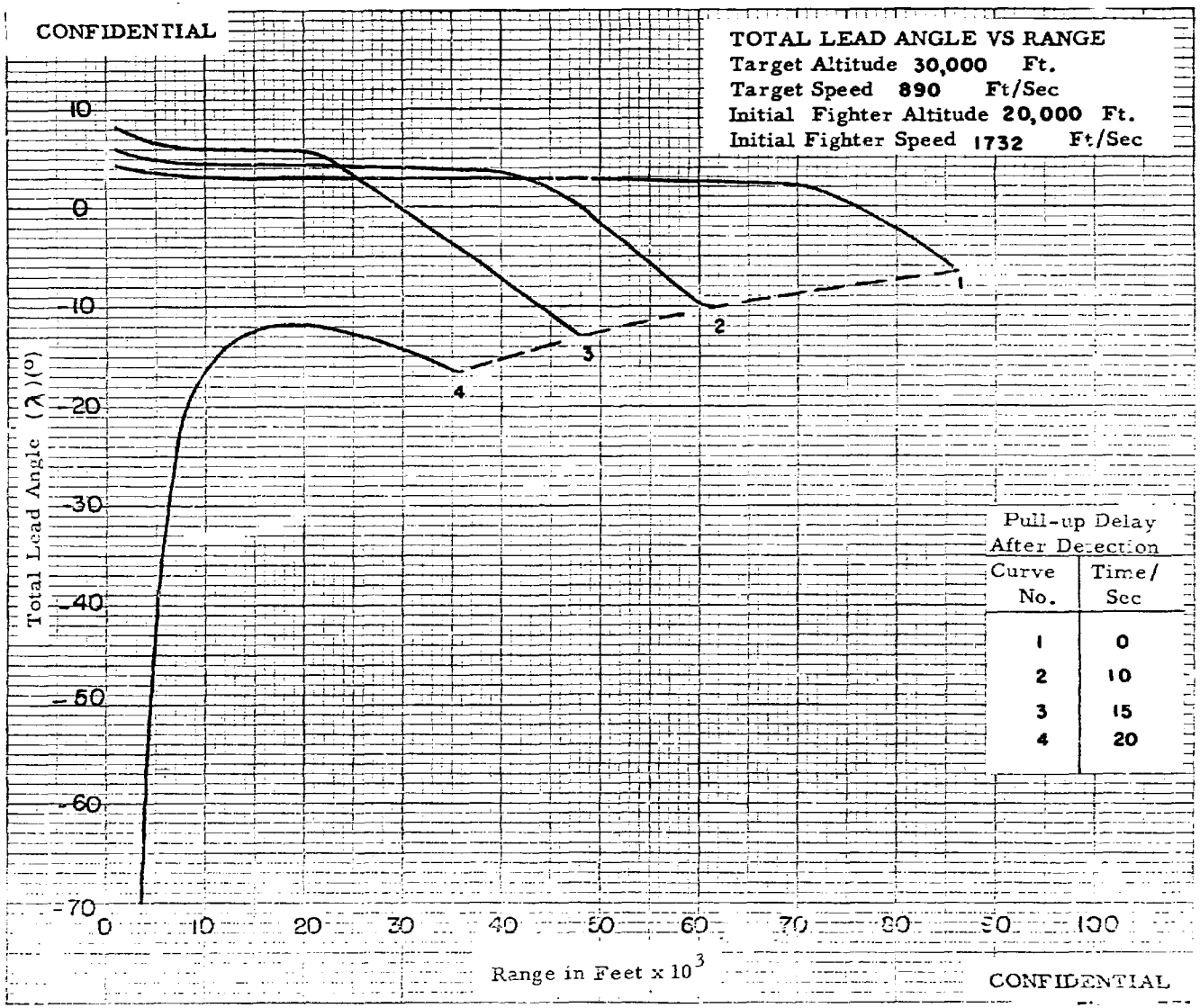

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 20 Sec. After Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
35
30
25
20
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

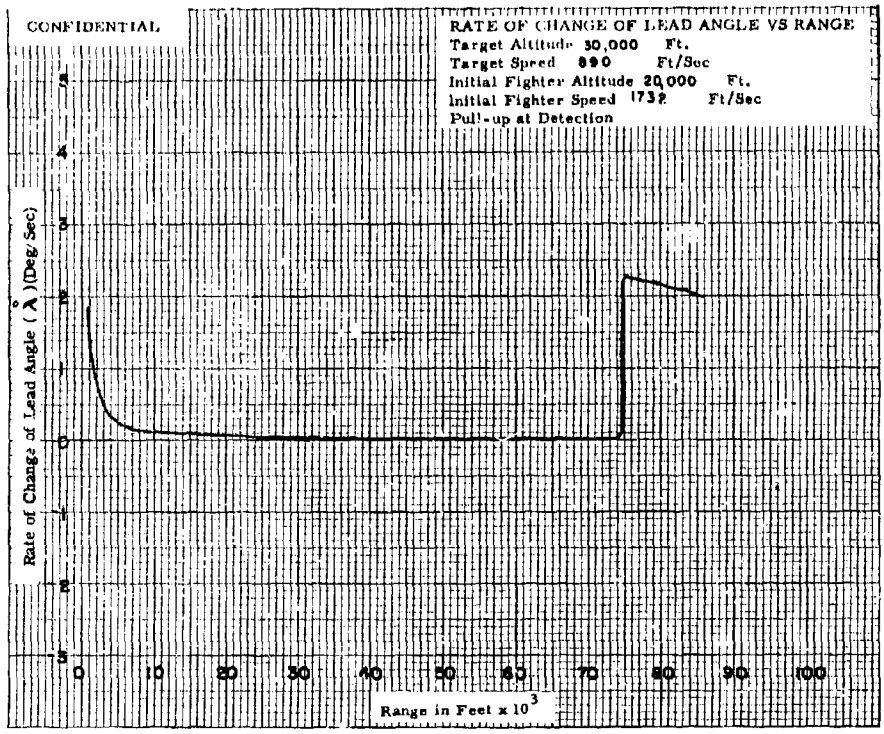
Figure 750

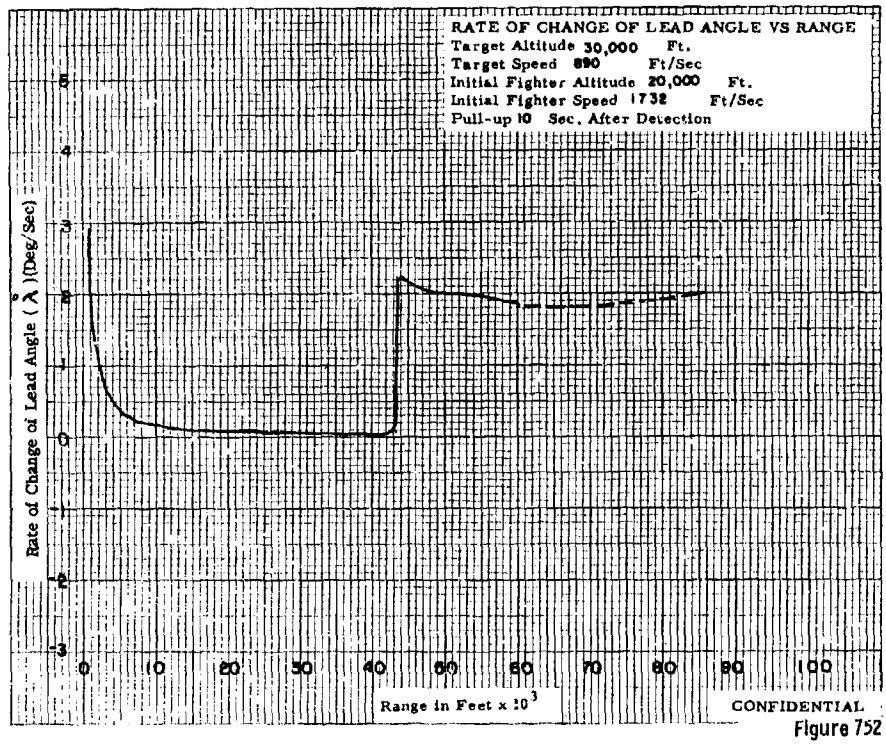
CONFIDENTIAL



CONFIDENTIAL

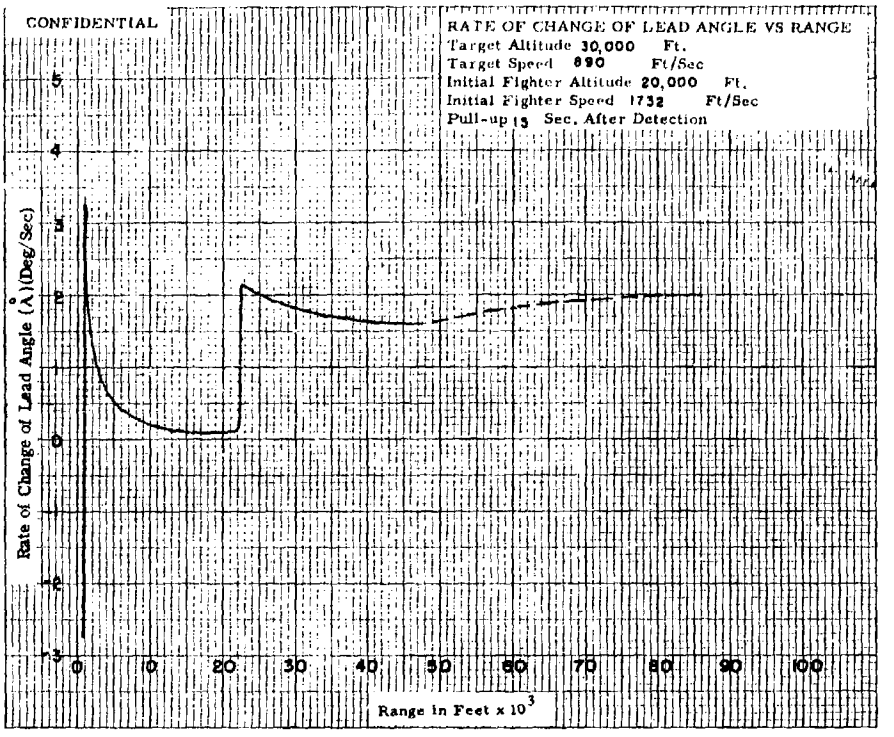
CONFIDENTIAL





CONFIDENTIAL

Figure 752


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 15 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
5
4
3
2
1
0
-1
-2
-3
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

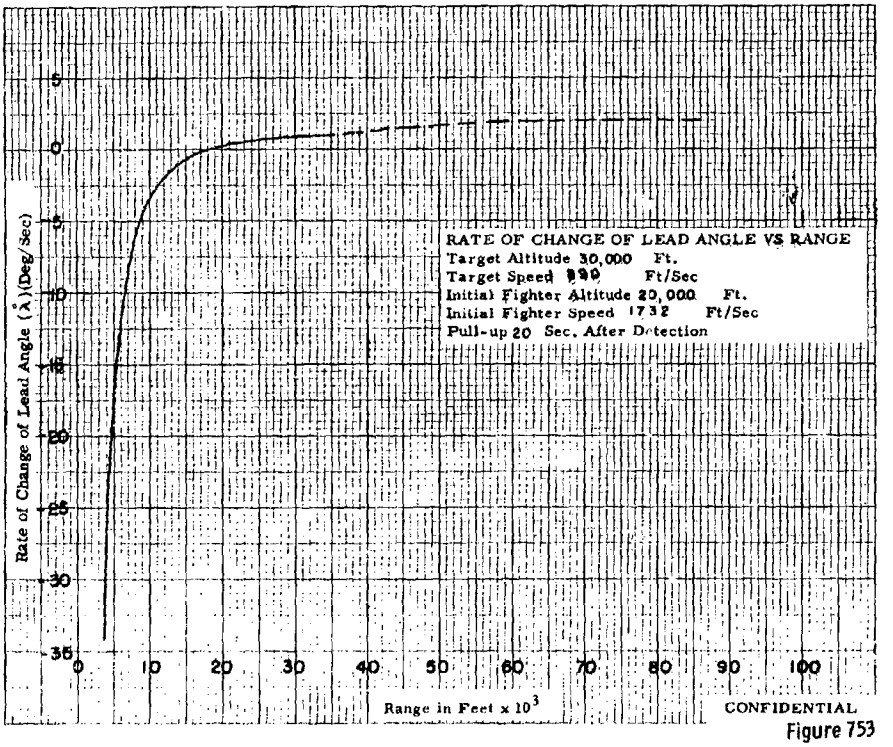
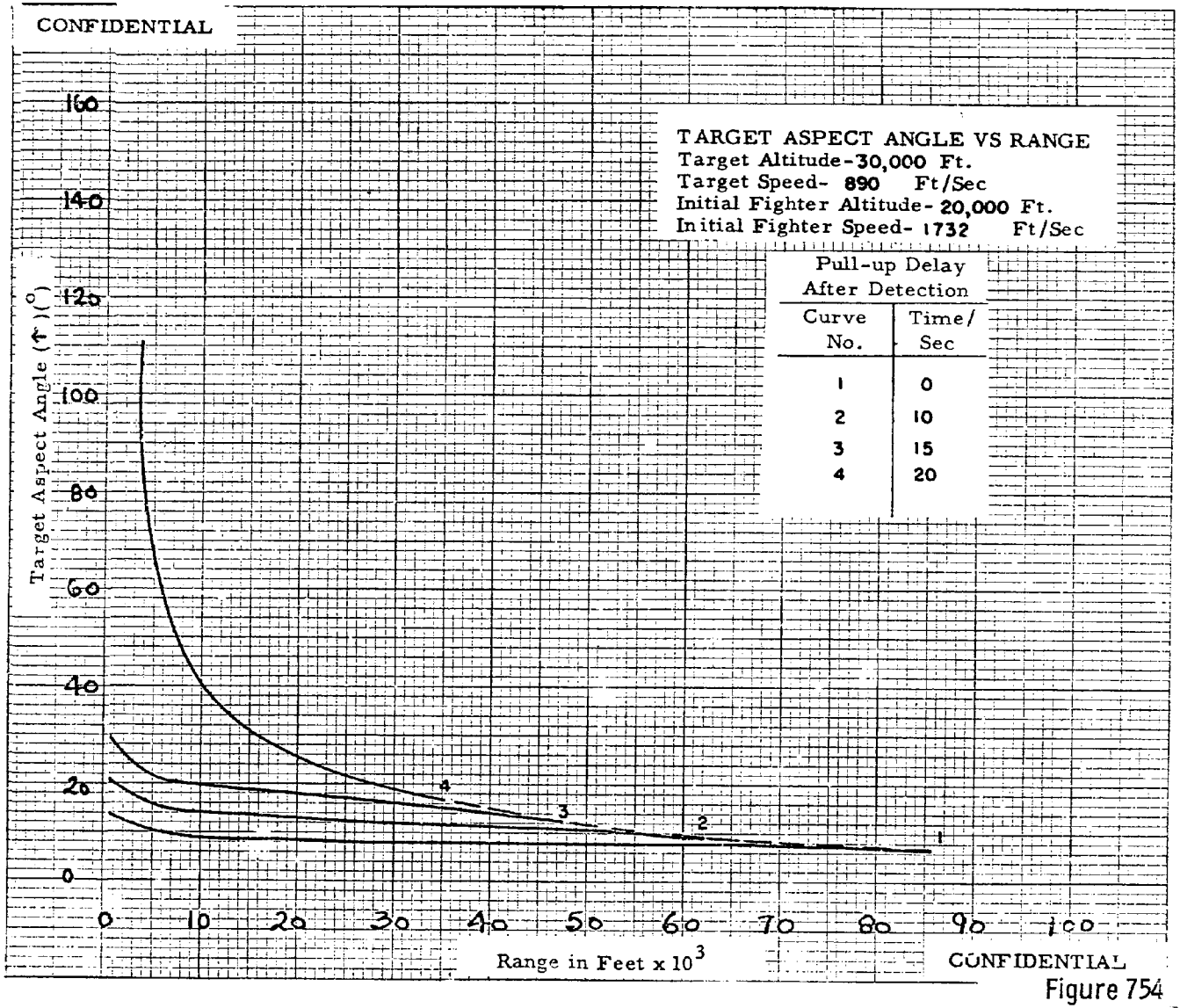

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1732 Ft/Sec
Pull-up 20 Sec. After Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
5
0
-5
-10
-15
-20
-25
-30
-35
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

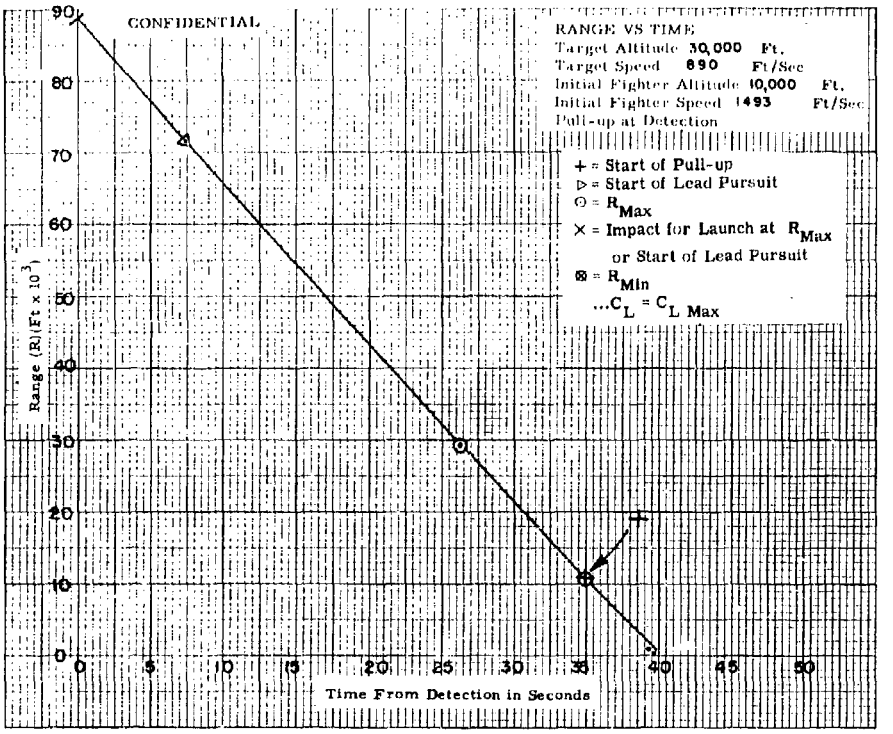
Figure 753

CONFIDENTIAL



CONFIDENTIAL

Figure 754


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

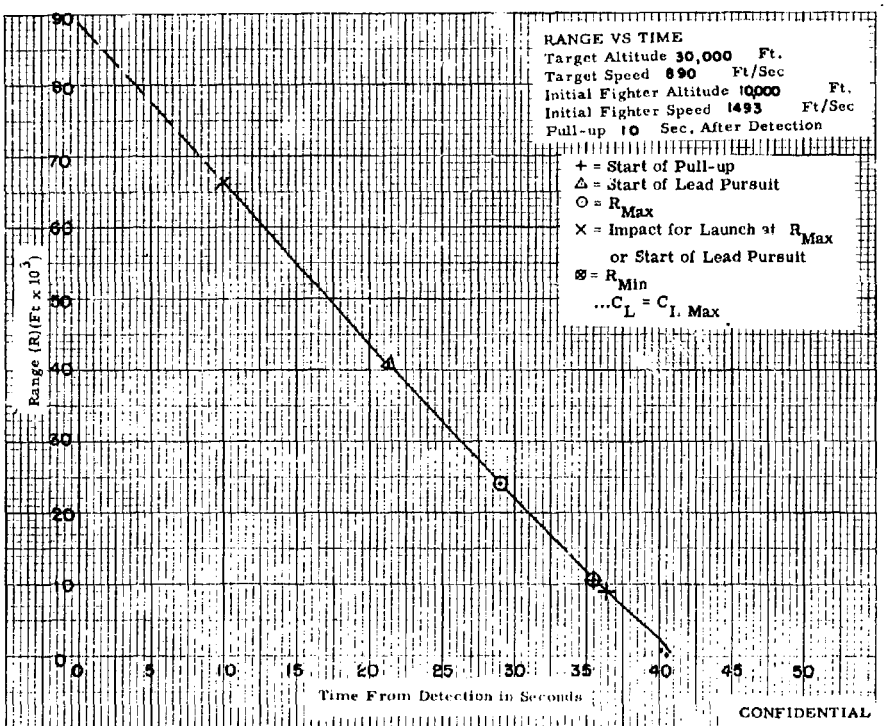
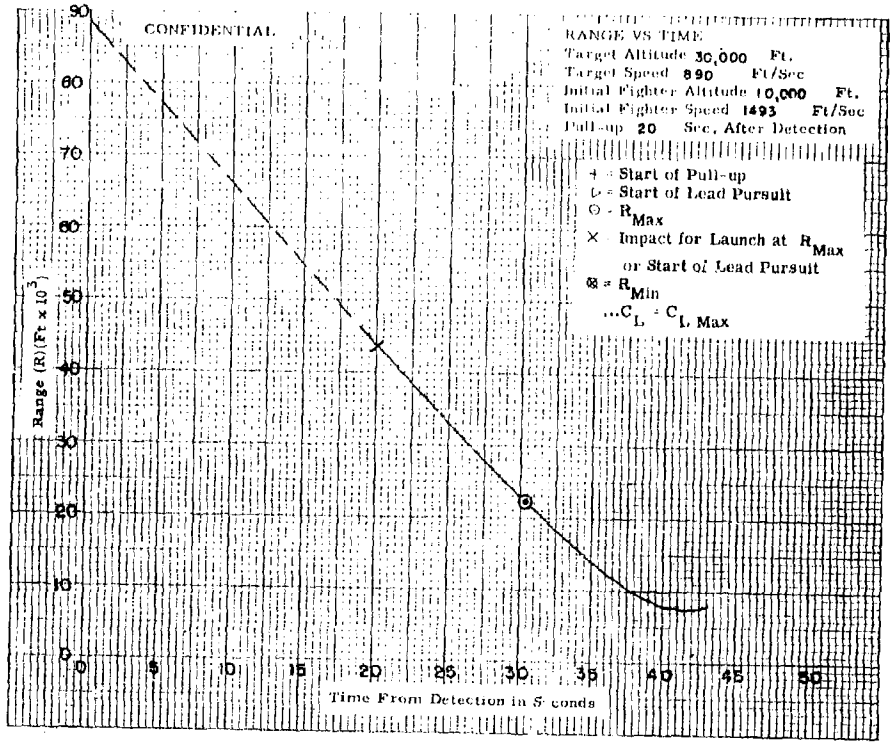

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 755


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 20 Sec. After Detection
+ = Start of Pull-up
L = Start of Lead Pursuit
O = R_{Max}
X Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

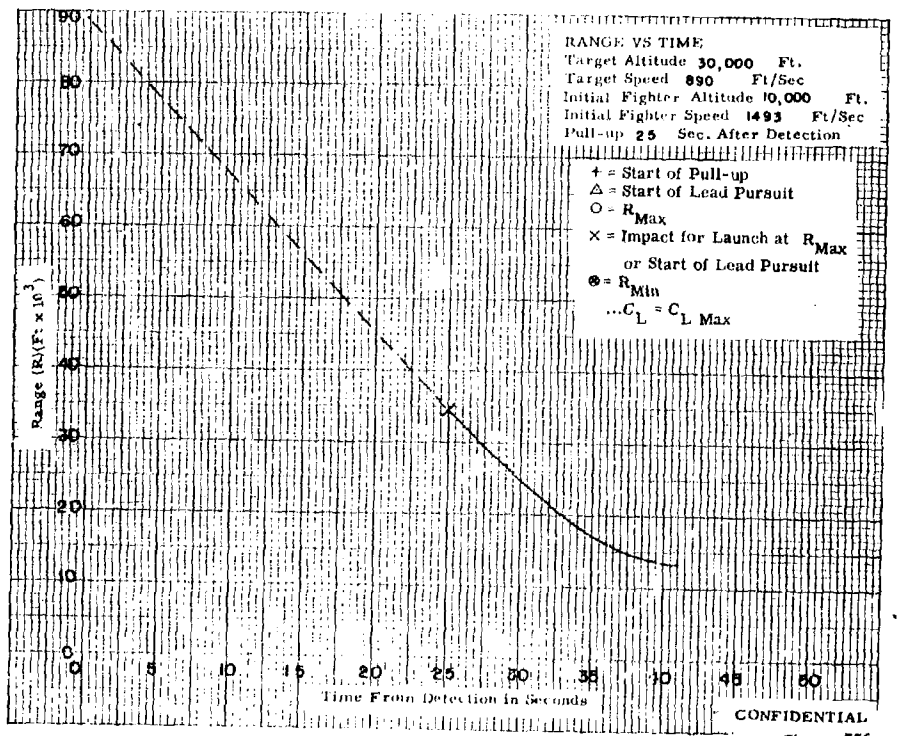
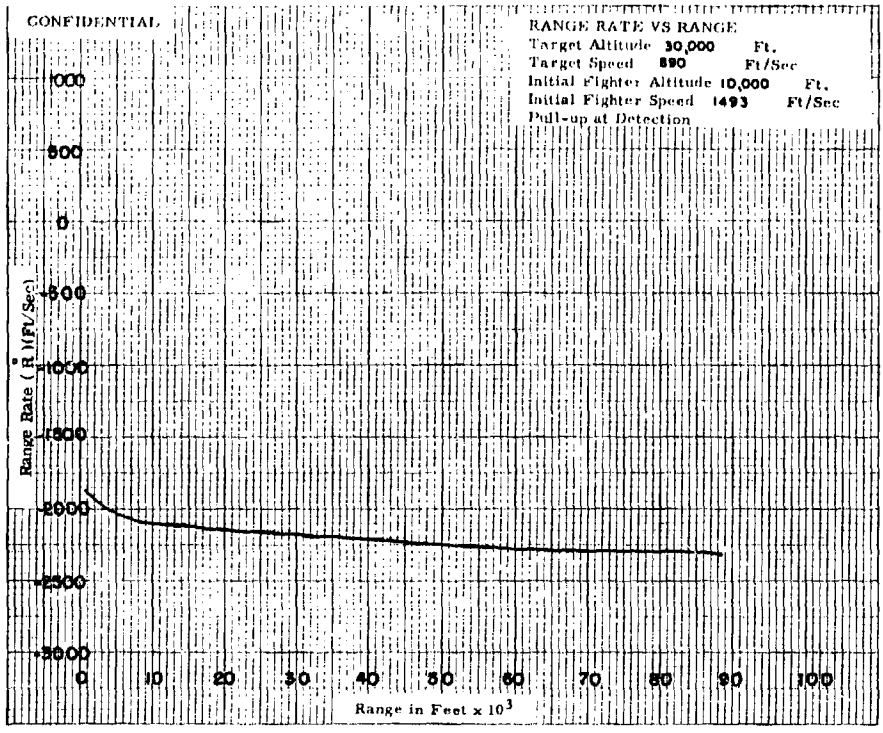

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 25 Sec. After Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
O = R_{Max}
X = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 756


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up at Detection
Range Rate ($\dot{R}$) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

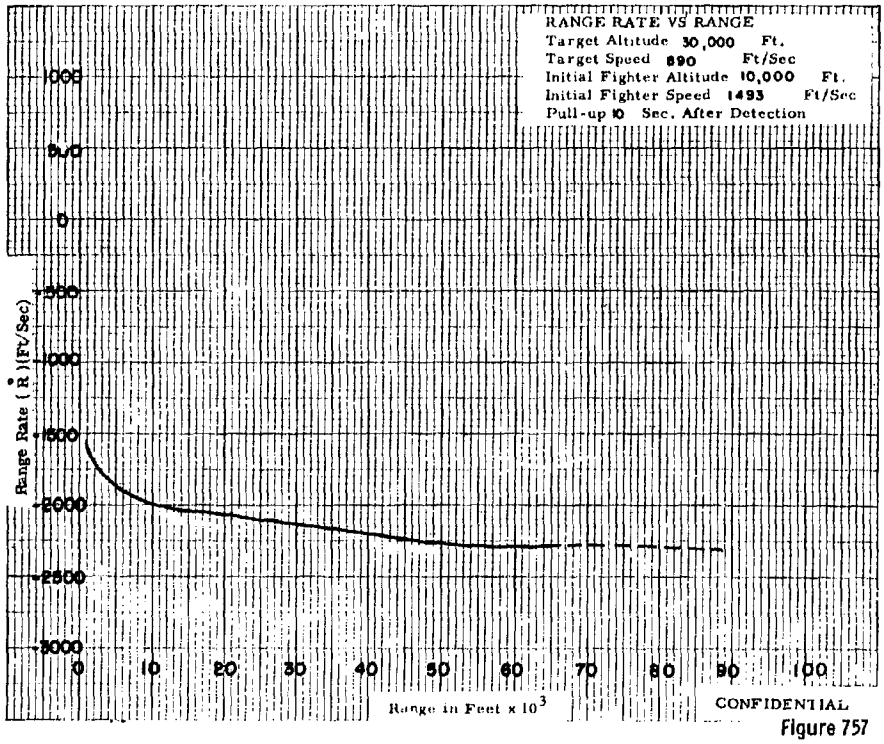
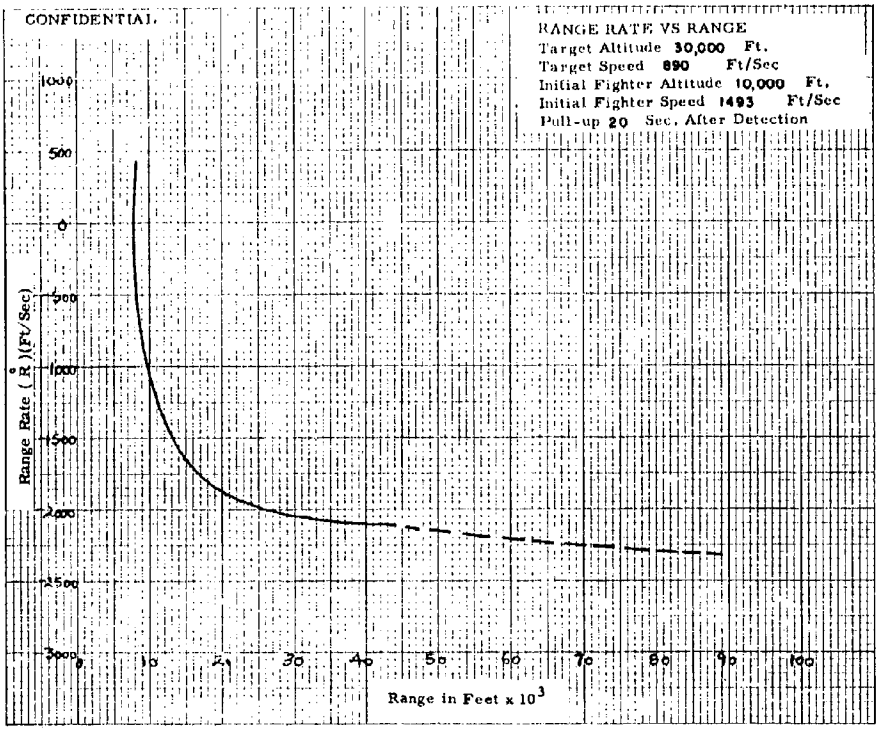

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 10 Sec. After Detection
Range Rate ($\dot{R}$) (Ft/Sec)
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 757


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 20 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
Range in Feet x 10³

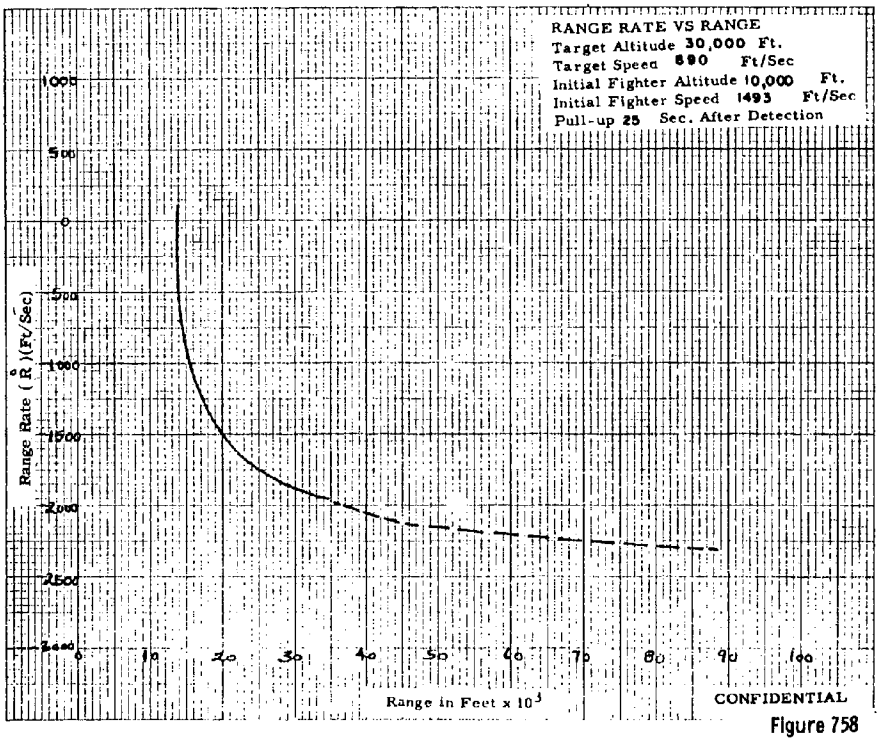

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 25 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
Range in Feet x 10³
CONFIDENTIAL

Figure 758

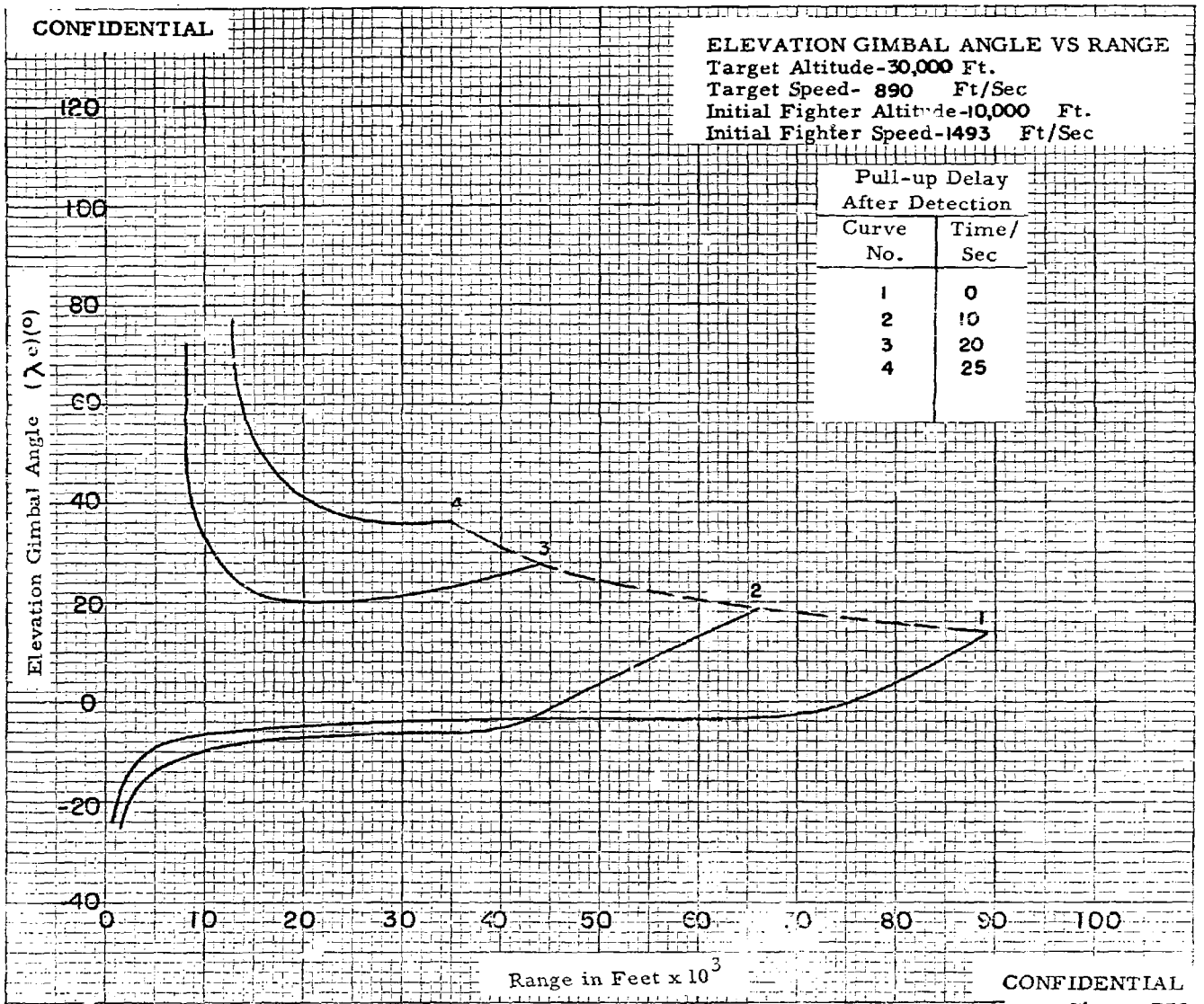
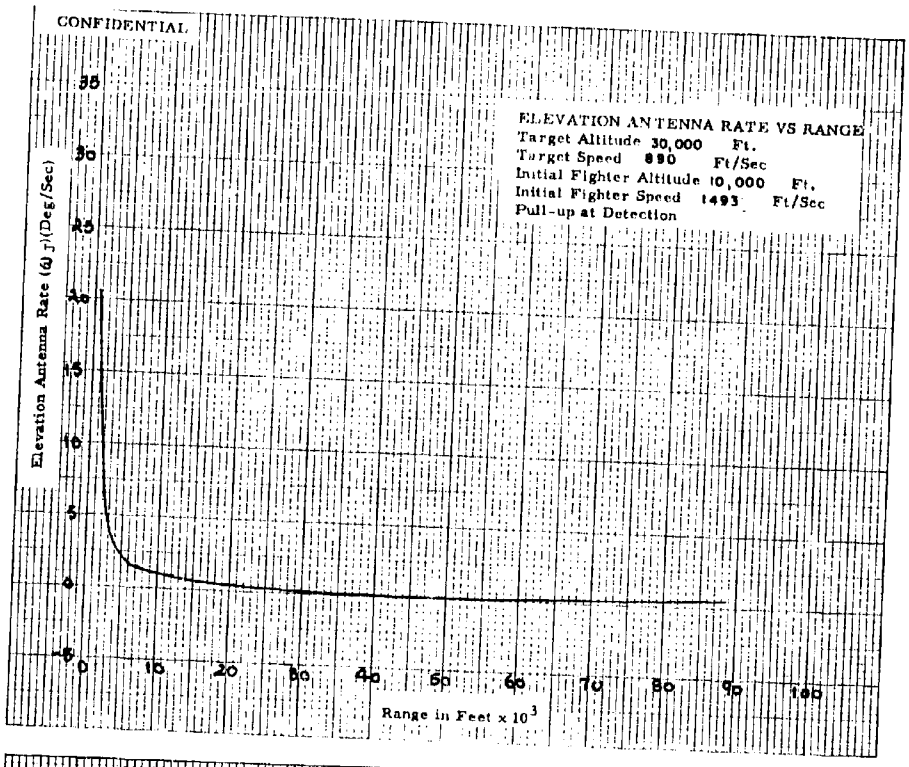

CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 890 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed-1493 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
3 | 20
4 | 25
Elevation Gimbal Angle (λe)(°)
120
100
80
60
40
20
0
-20
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 759


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up at Detection
Elevation Antenna Rate (ω T)(Deg/Sec)
35
30
25
20
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

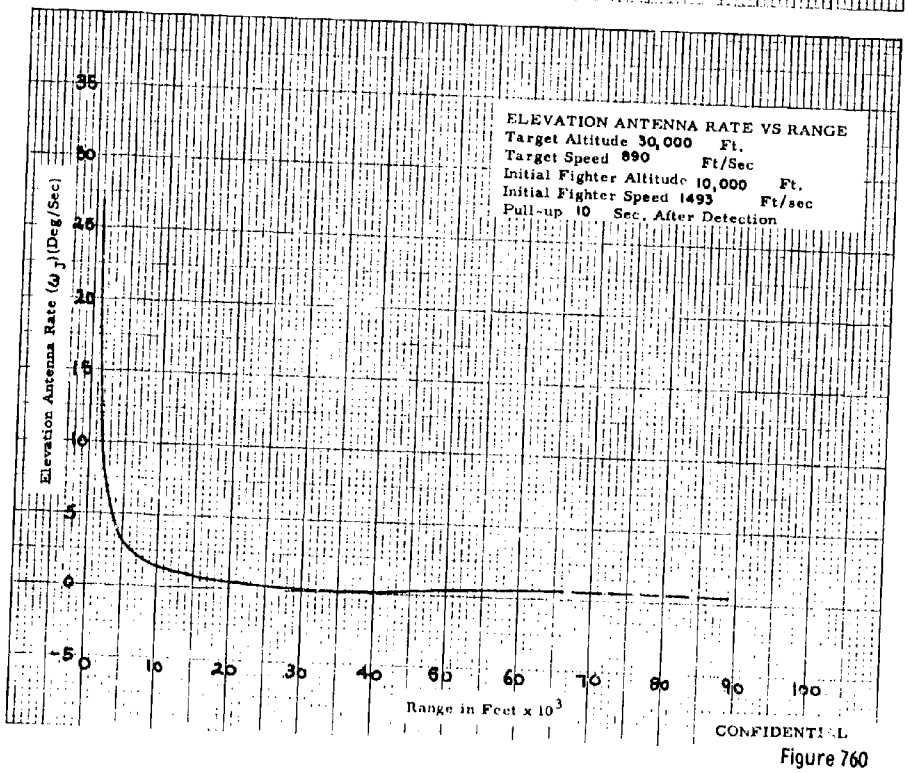

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/sec
Pull-up 10 Sec. After Detection
Elevation Antenna Rate (ω T)(Deg/Sec)
35
30
25
20
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 760

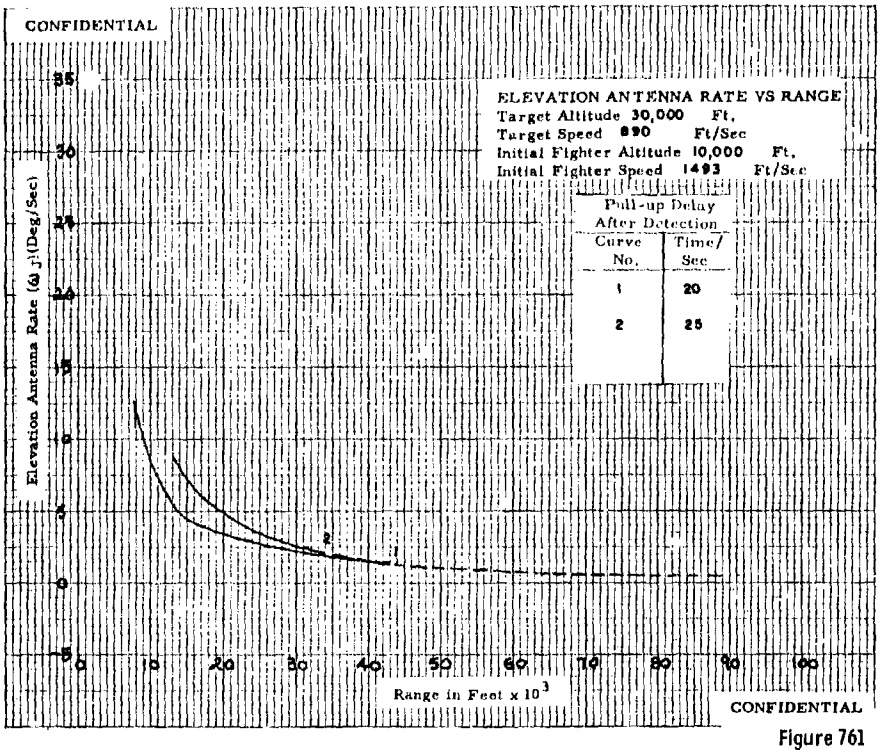


Figure 761

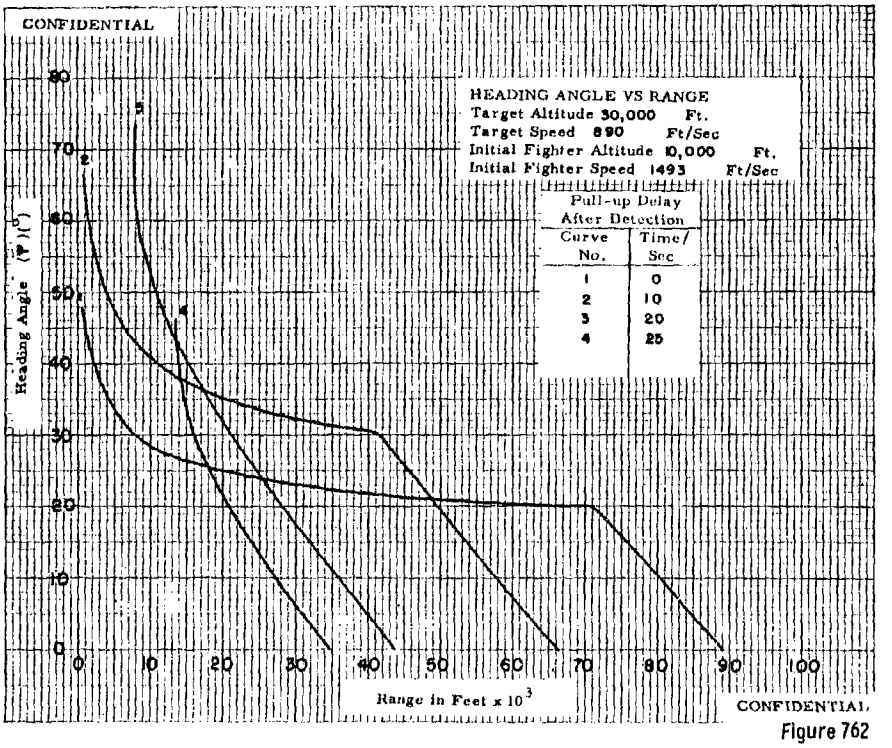
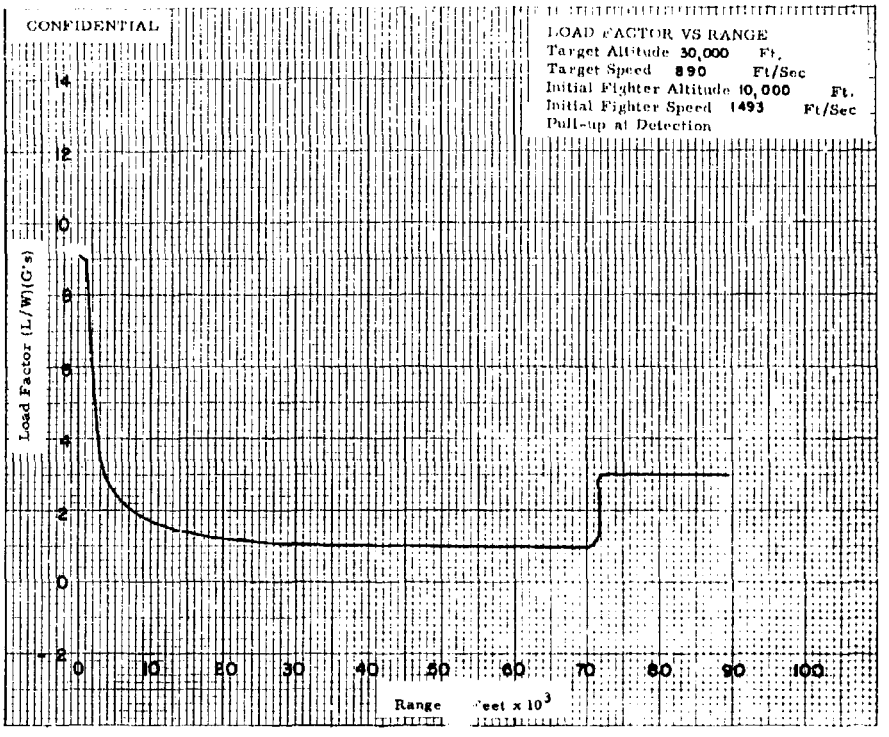


Figure 762


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
Range Feet x 10^3

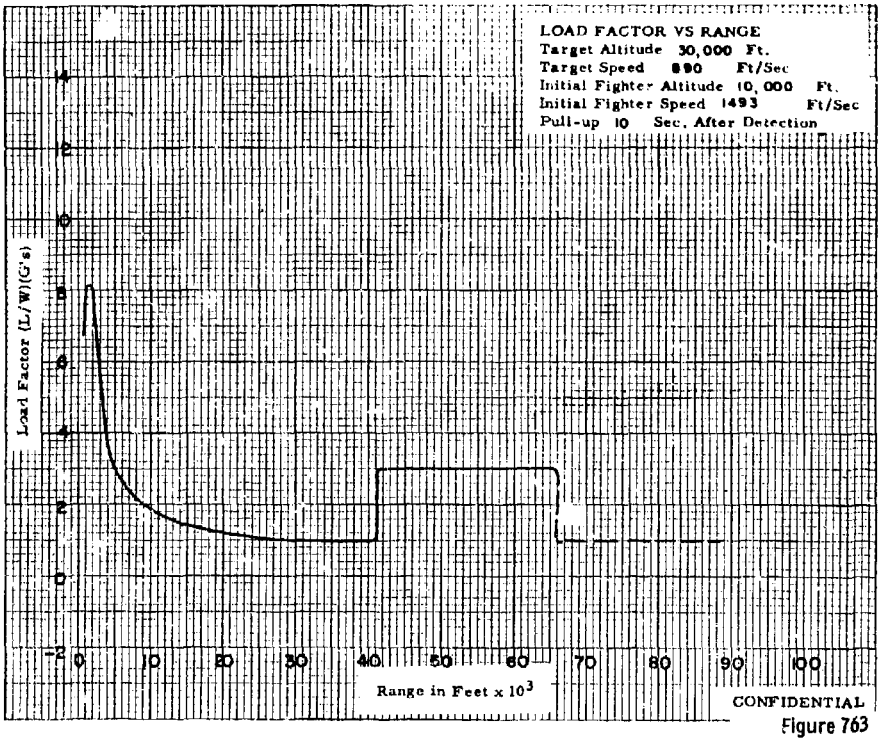
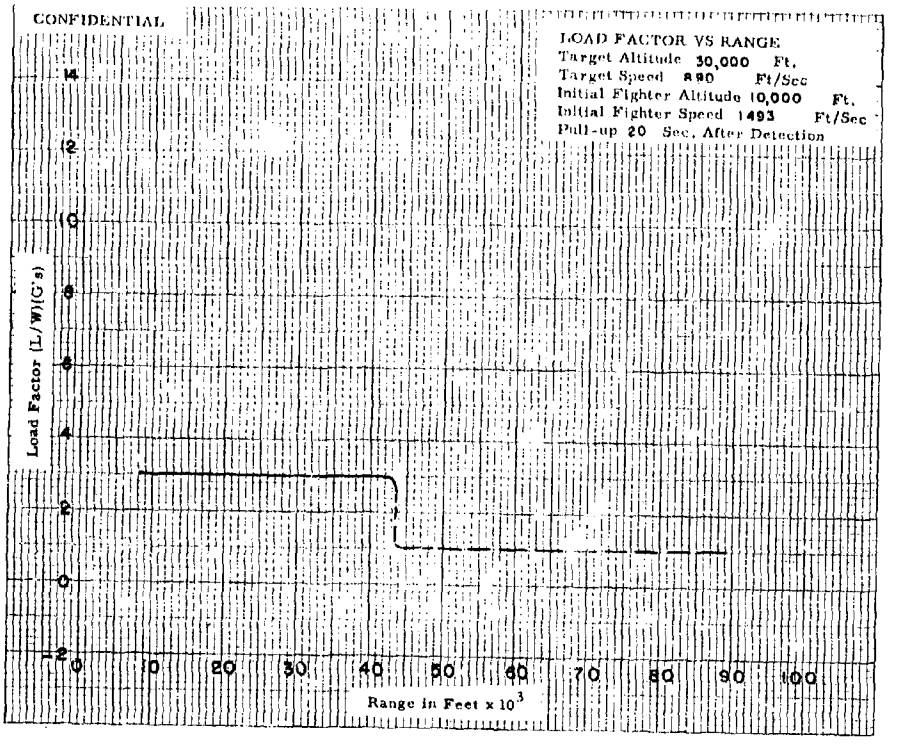
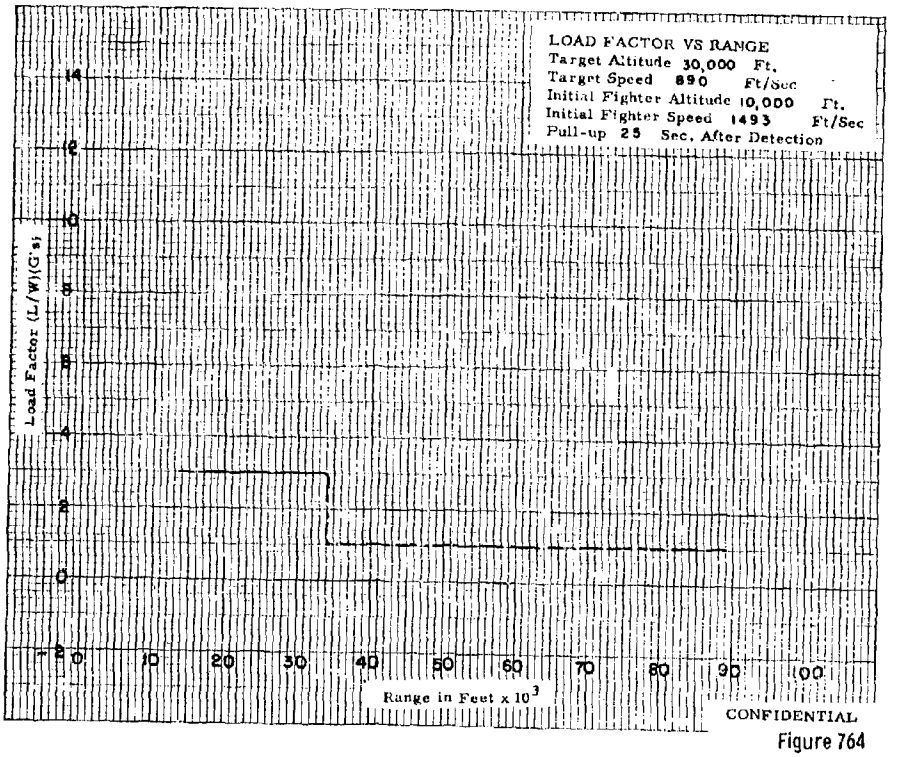

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 10 Sec. After Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

Figure 763

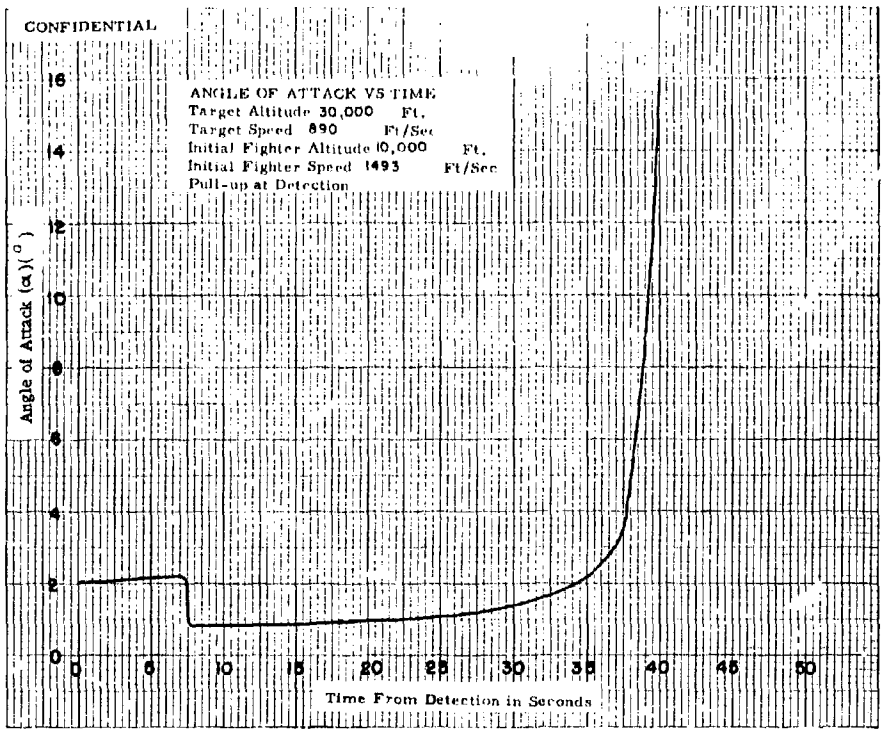
CONFIDENTIAL





CONFIDENTIAL

Figure 764


ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up at Detection
Angle of Attack (α)(°)
Time From Detection in Seconds

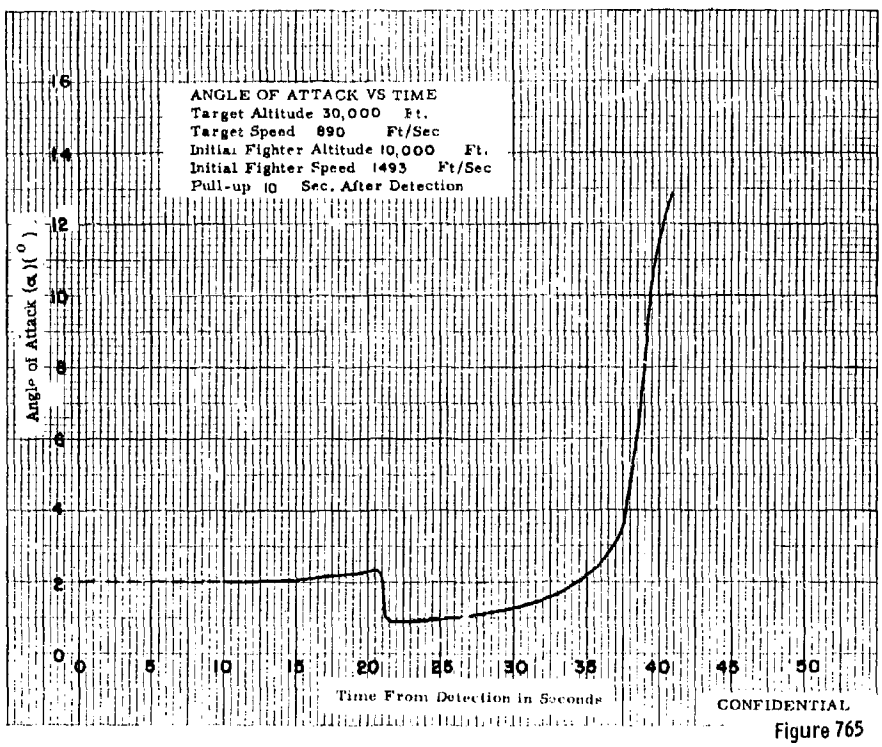
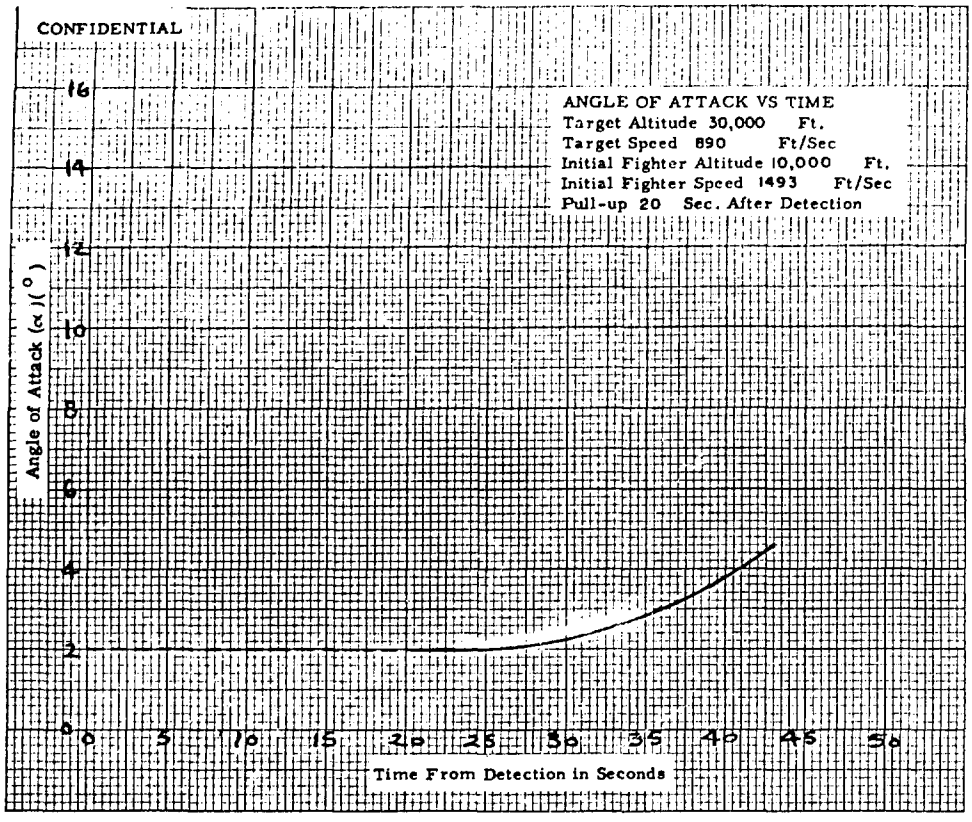

ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 10 Sec. After Detection
Angle of Attack (α)(°)
Time From Detection in Seconds

Figure 765


ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 20 Sec. After Detection
Angle of Attack (α)(°)
0
2
4
6
8
10
12
14
16
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds

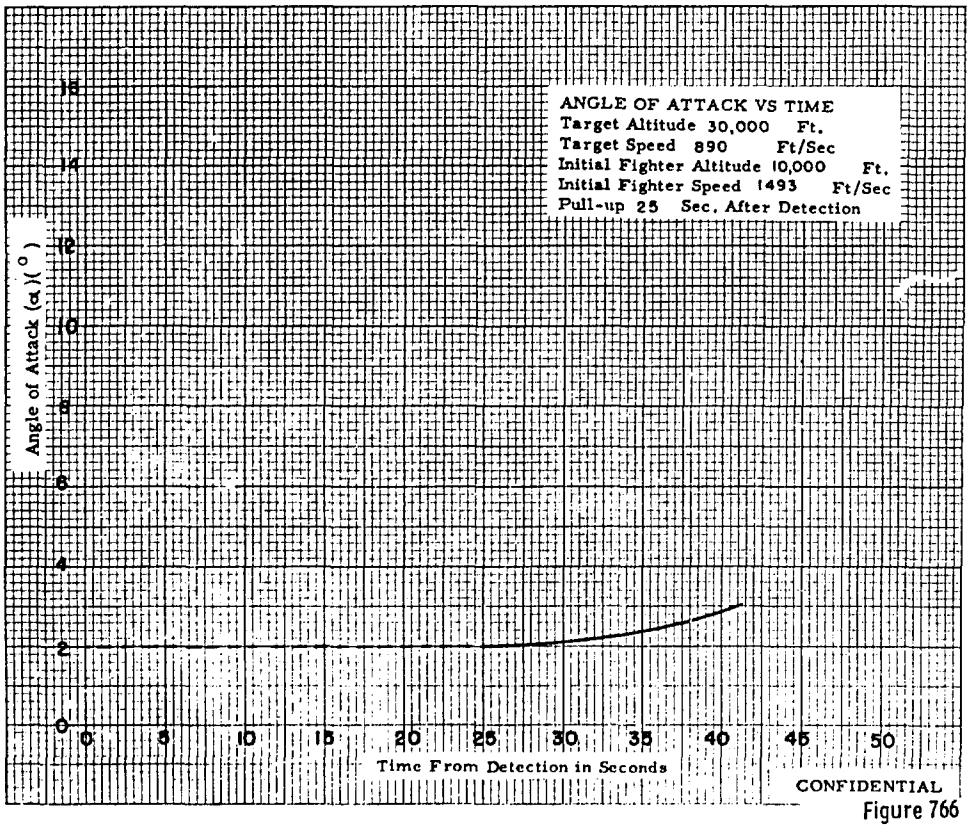

ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 25 Sec. After Detection
Angle of Attack (α)(°)
0
2
4
6
8
10
12
14
16
0 5 10 15 20 25 30 35 40 45 50
Time From Detection in Seconds

Figure 766

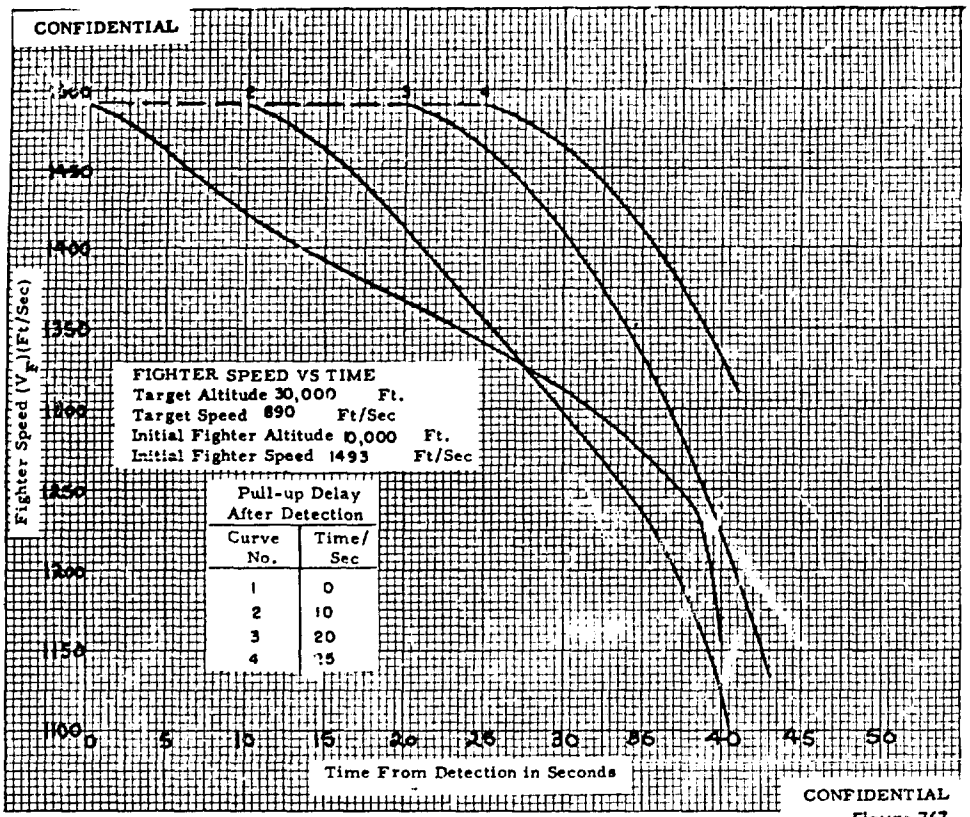


Figure 767

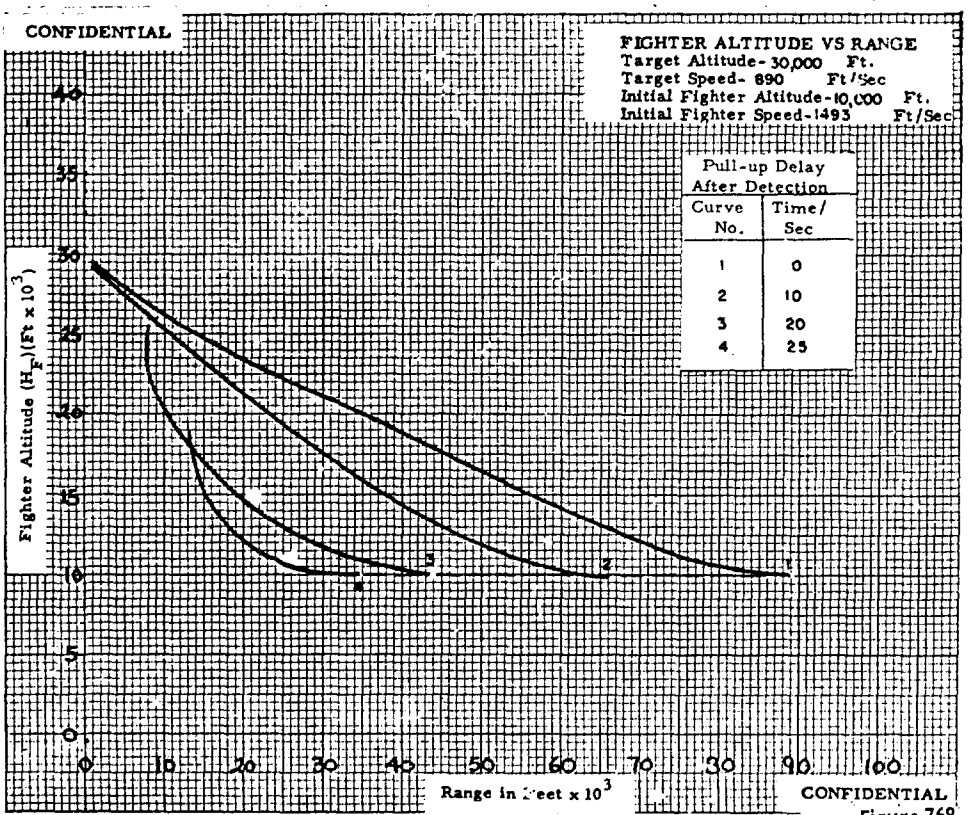
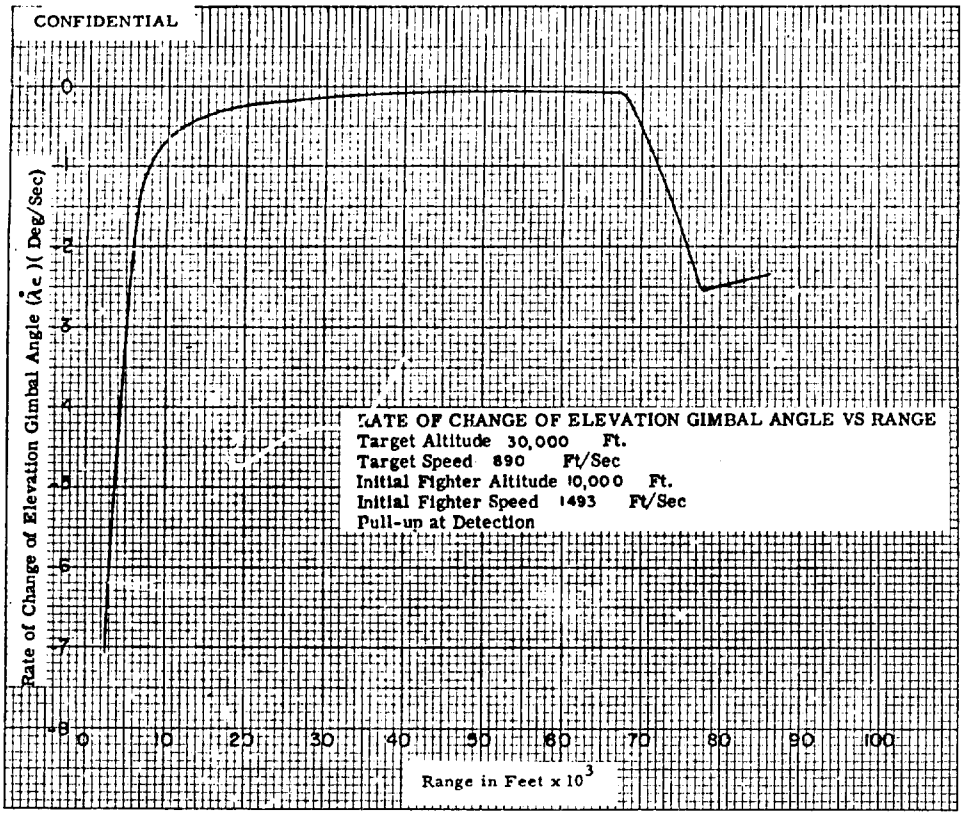


Figure 768


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle (λ̇e) (Deg/Sec)
0
-1
-2
-3
-4
-5
-6
-7
-8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

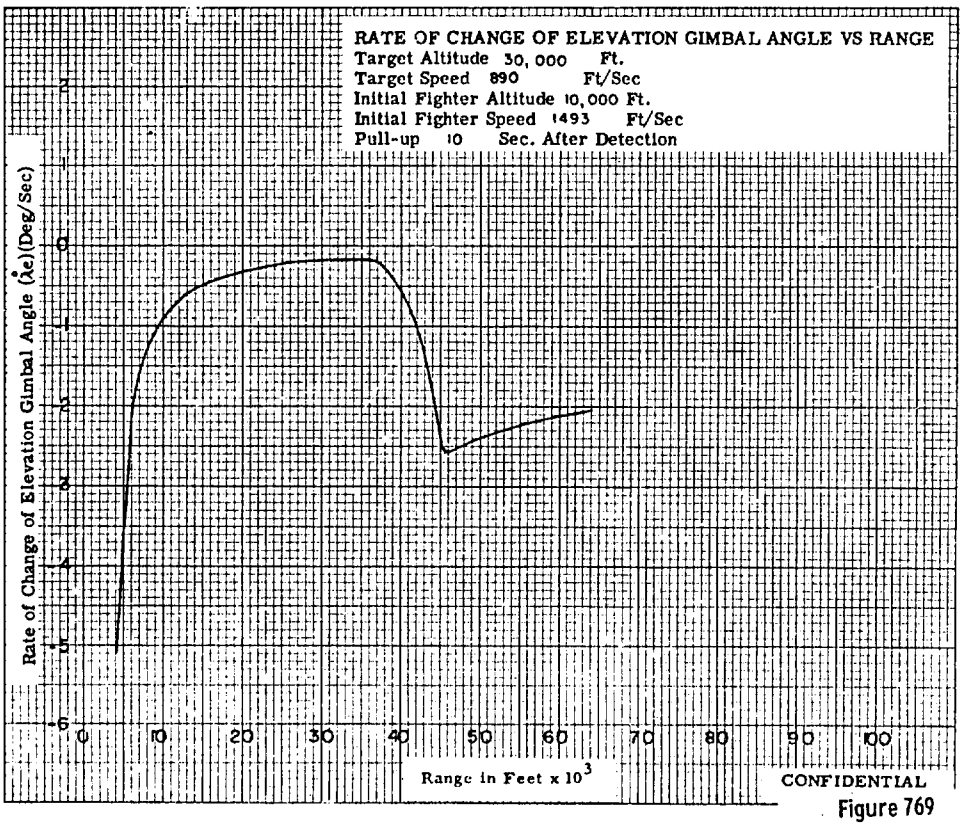

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
2
1
0
-1
-2
-3
-4
-5
-6
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 769

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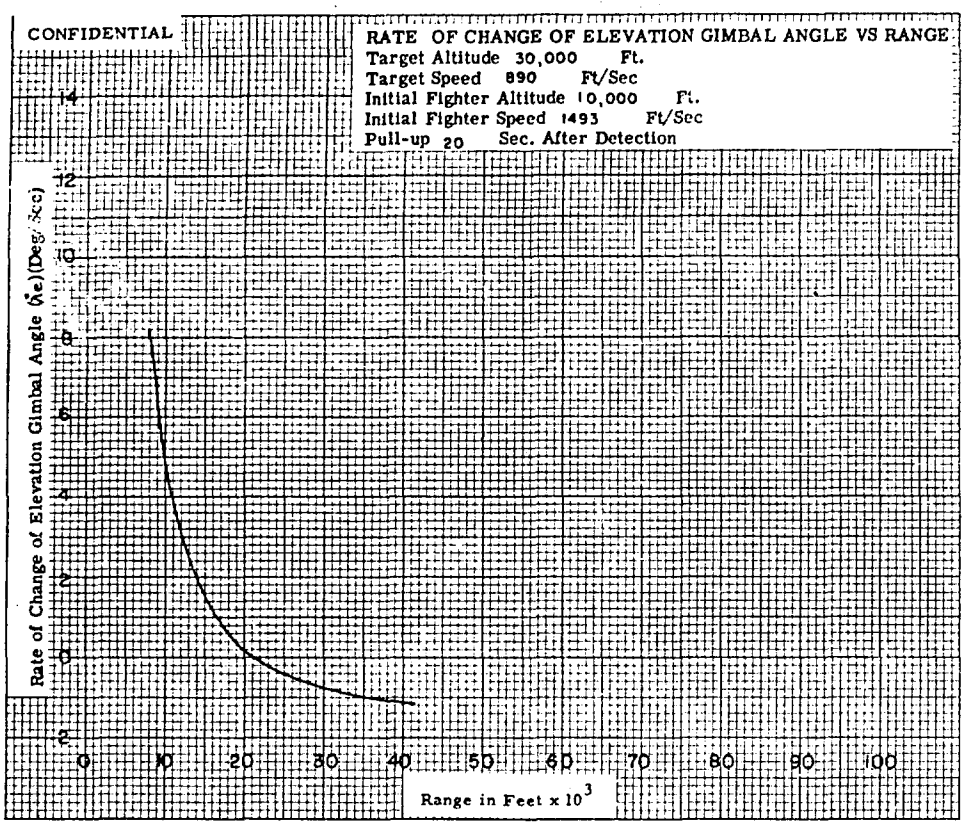
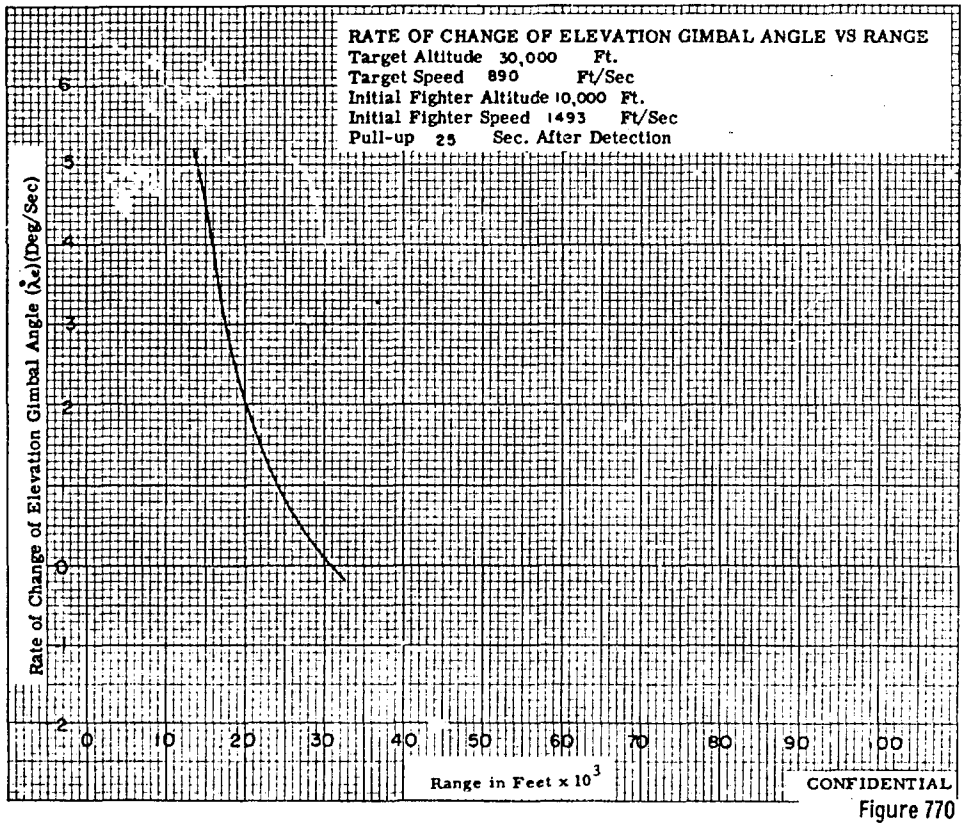
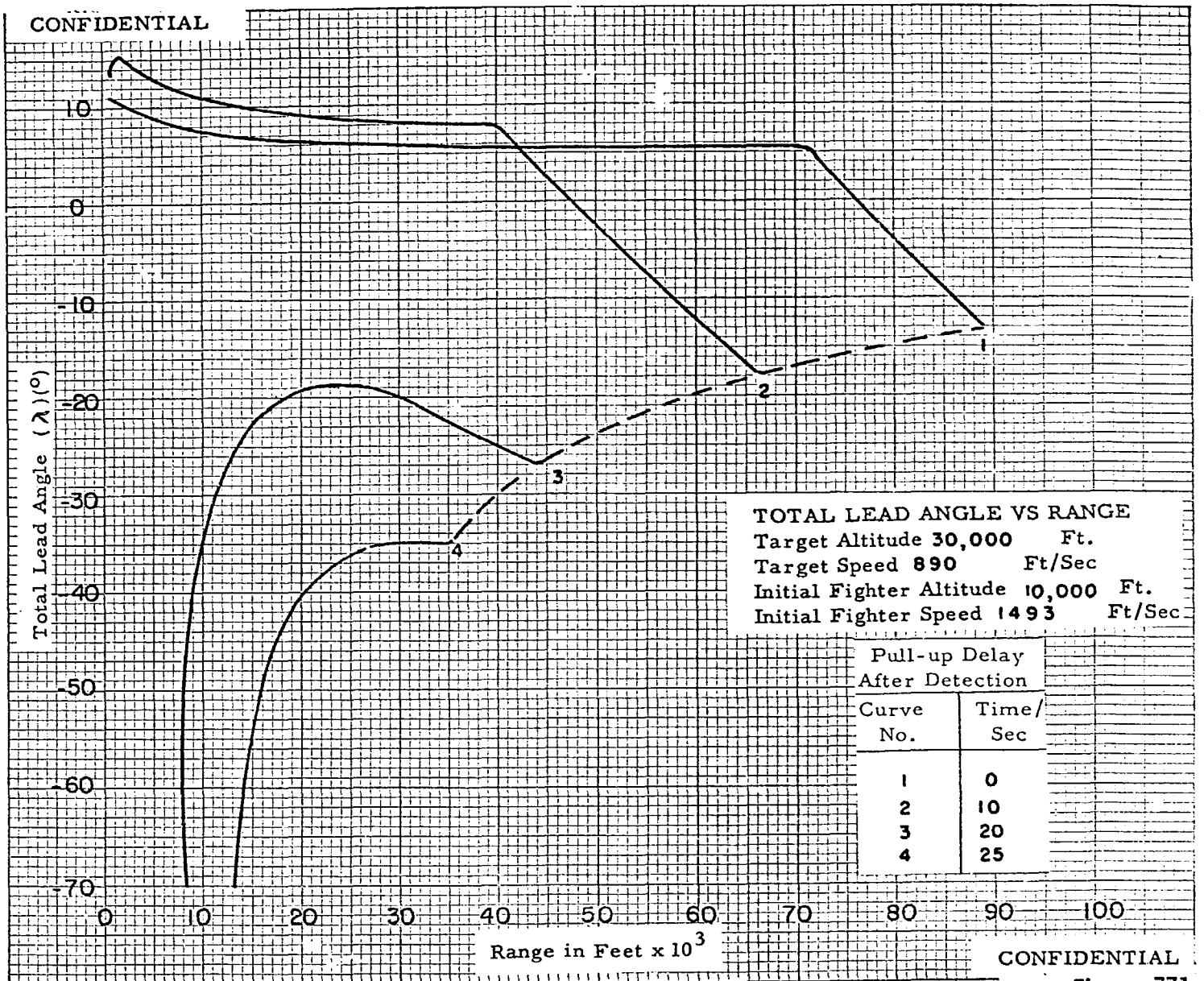




CONFIDENTIAL

Figure 770

CONFIDENTIAL



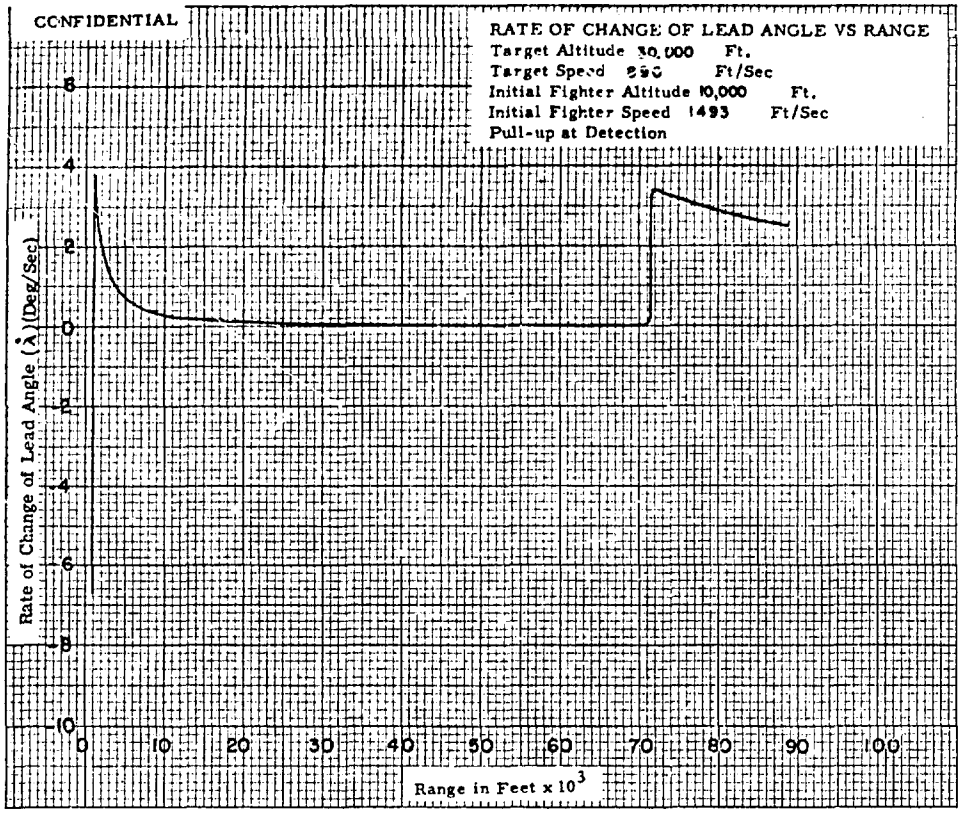
TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec

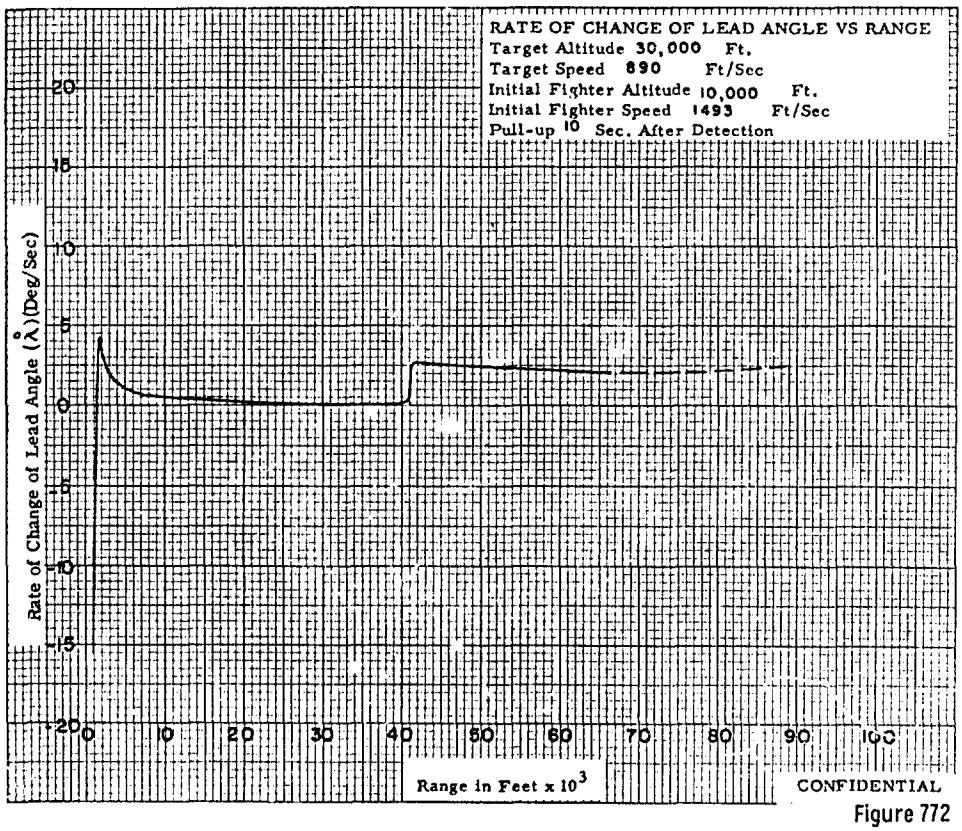
Pull-up Delay After Detection	
Curve No.	Time/ Sec
1	0
2	10
3	20
4	25

CONFIDENTIAL

Figure 771

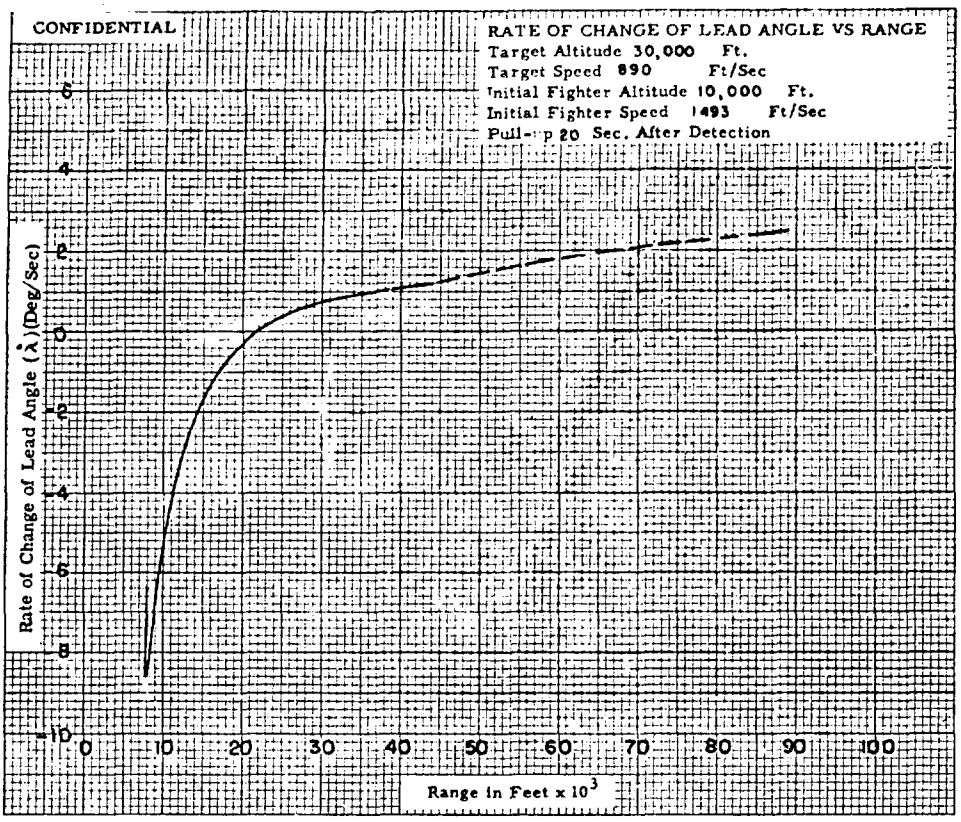
CONFIDENTIAL





CONFIDENTIAL

Figure 772


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 20 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
6
4
2
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

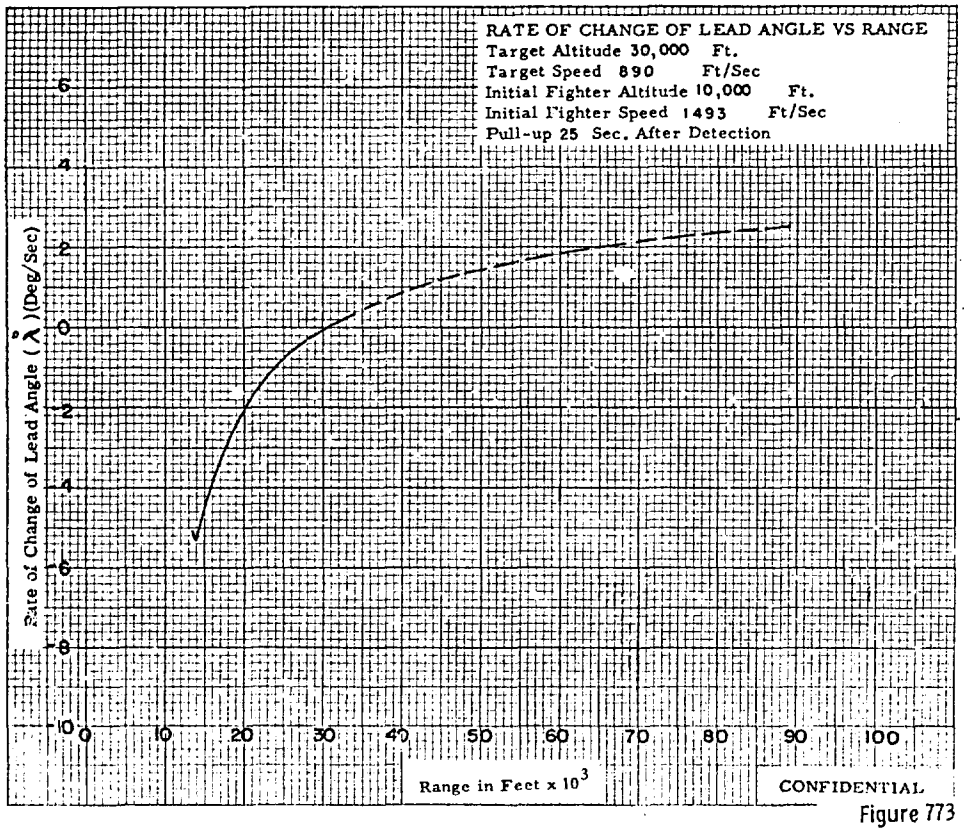

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1493 Ft/Sec
Pull-up 25 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
6
4
2
0
-2
-4
-6
-8
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 773

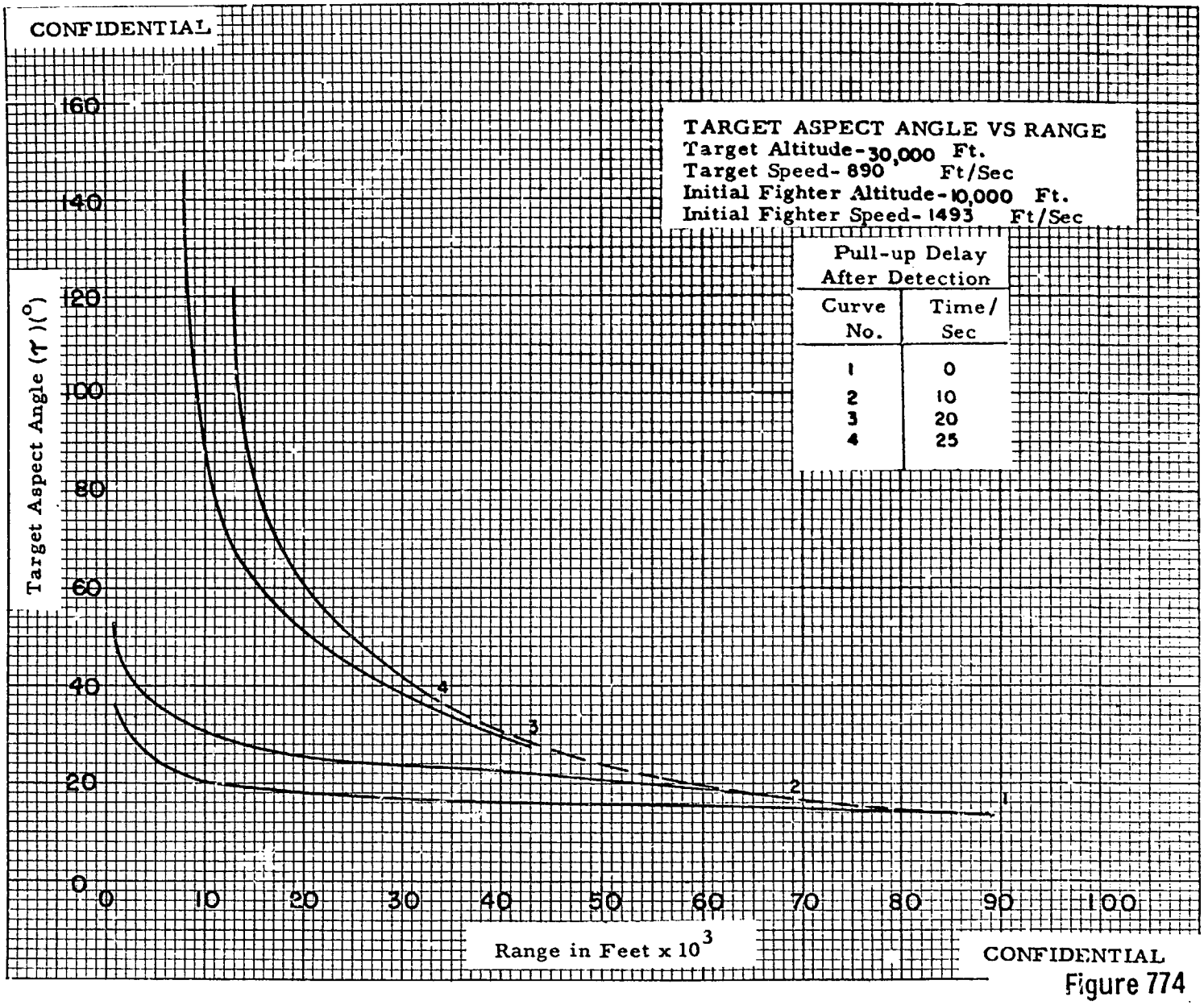
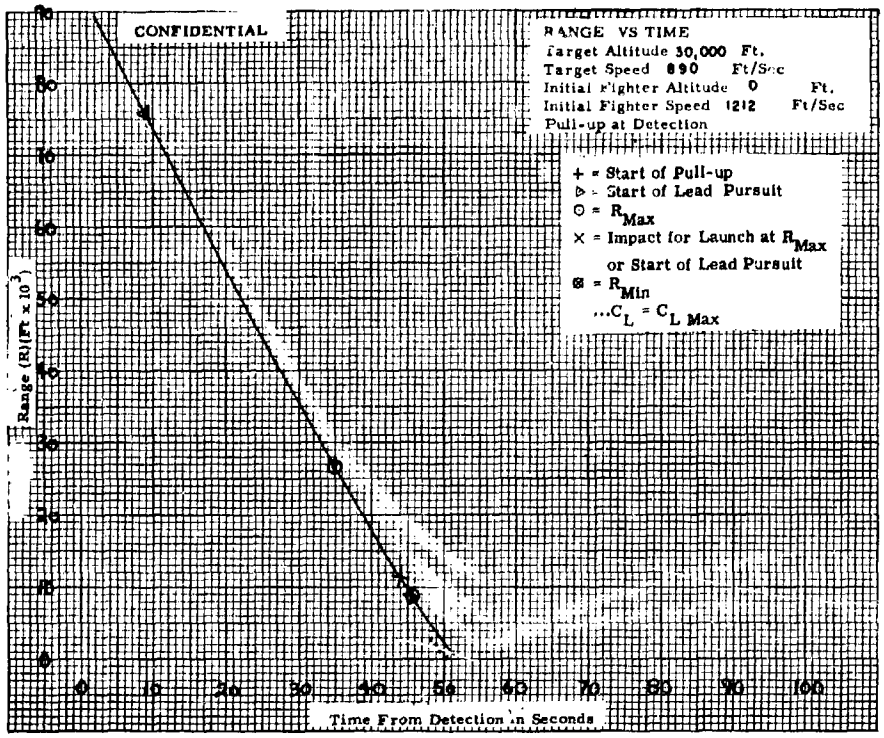

TARGET ASPECT ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed-890 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed-1493 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
3 | 20
4 | 25
Target Aspect Angle (τ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
1
2
3
4

Figure 774


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R) Ft x 10^3
0 10 20 30 40 50 60 70 80 90 100
Time From Detection in Seconds

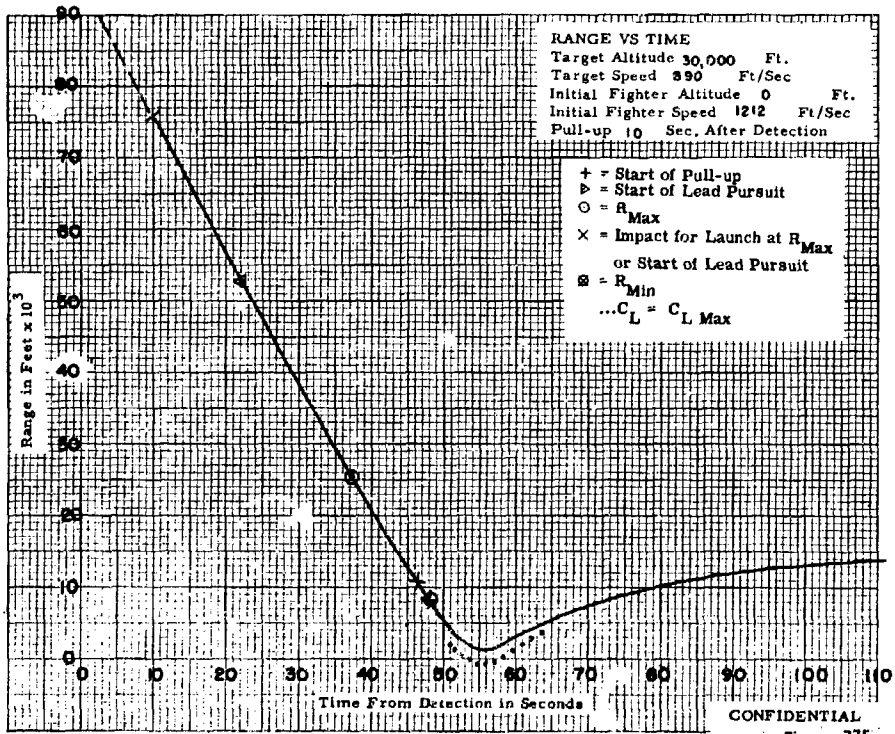
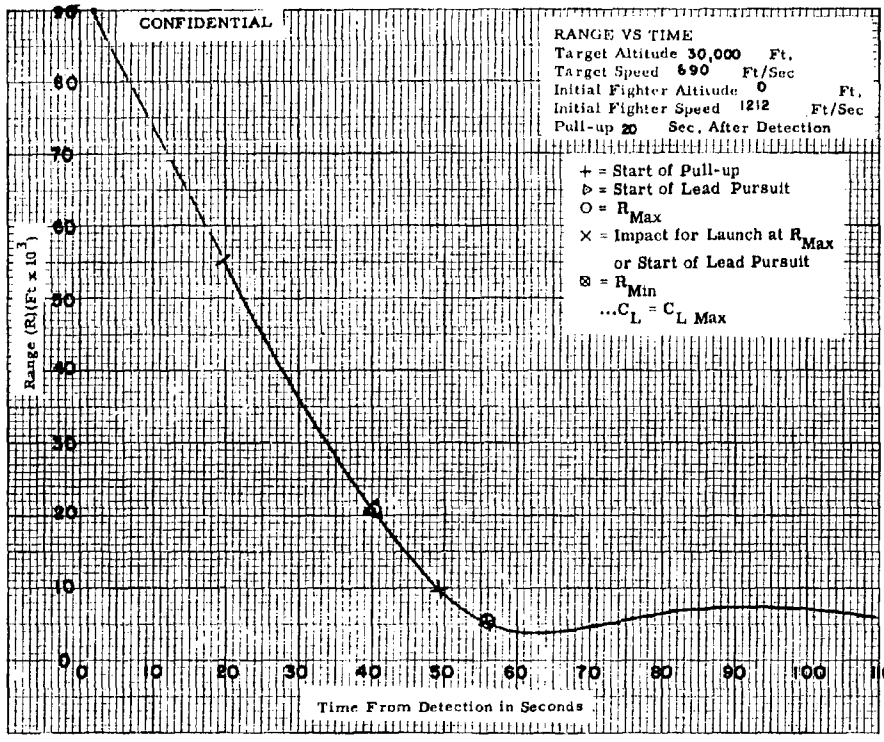

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 10 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90 100 110
Time From Detection in Seconds
CONFIDENTIAL

Figure 775


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 690 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 20 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

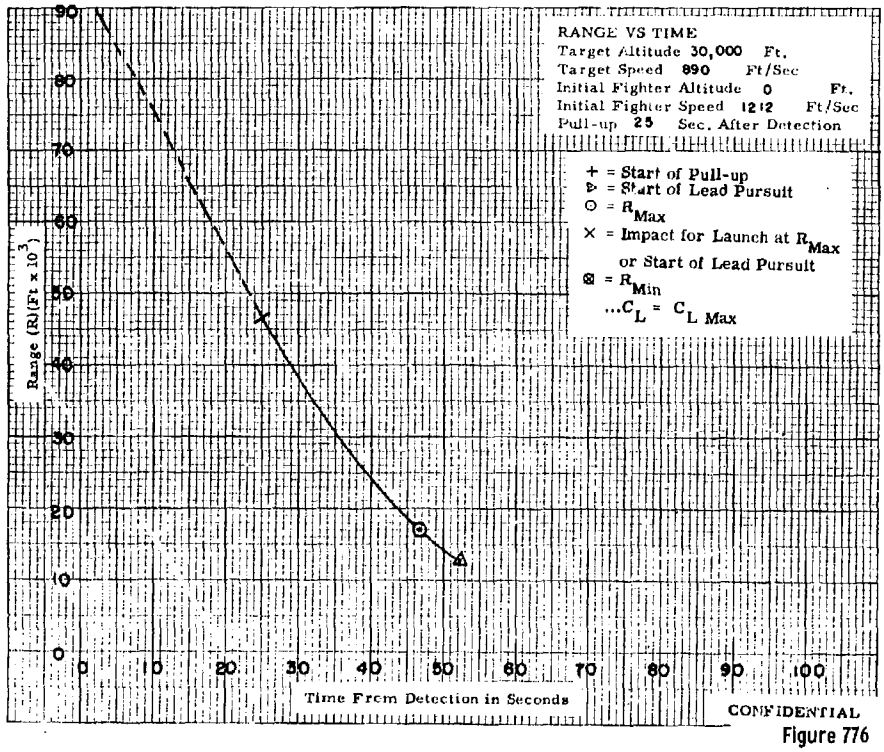
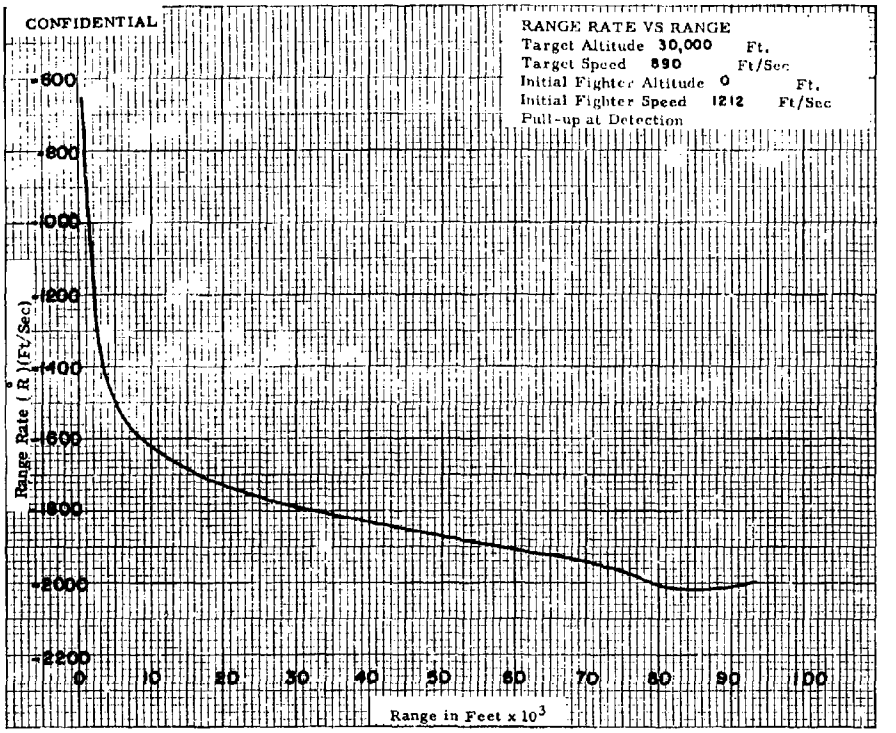

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 25 Sec. After Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 776

CONFIDENTIAL



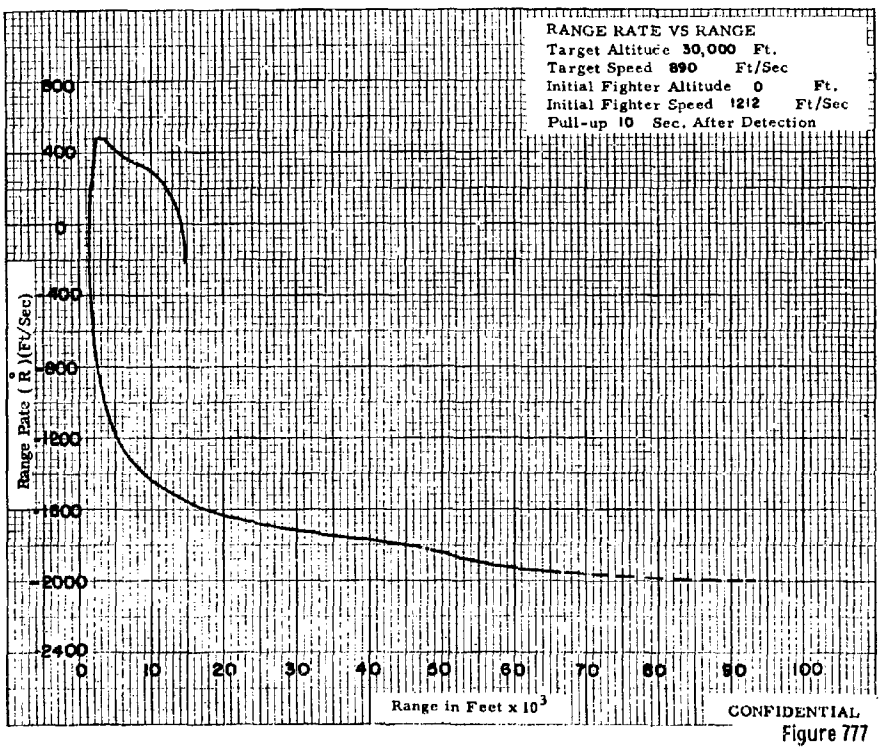


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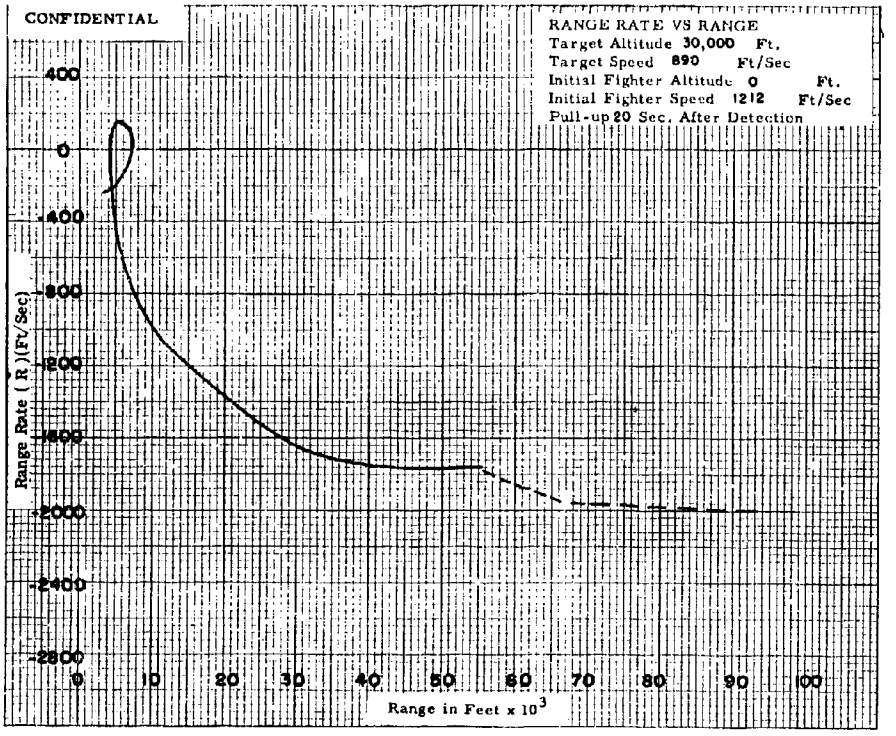
Figure 777


RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 20 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
400
0
-400
-800
-1200
-1600
-2000
-2400
-2800
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

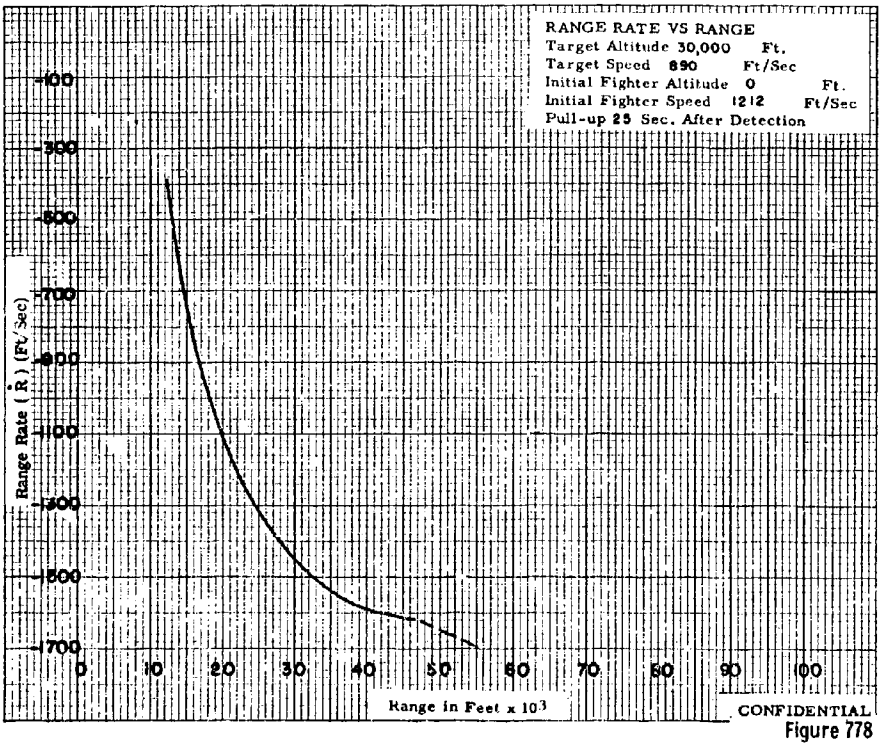

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 25 Sec. After Detection
Range Rate (Ṙ) (Ft/Sec)
-100
-300
-500
-700
-900
-1100
-1300
-1500
-1700
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 778

CONFIDENTIAL

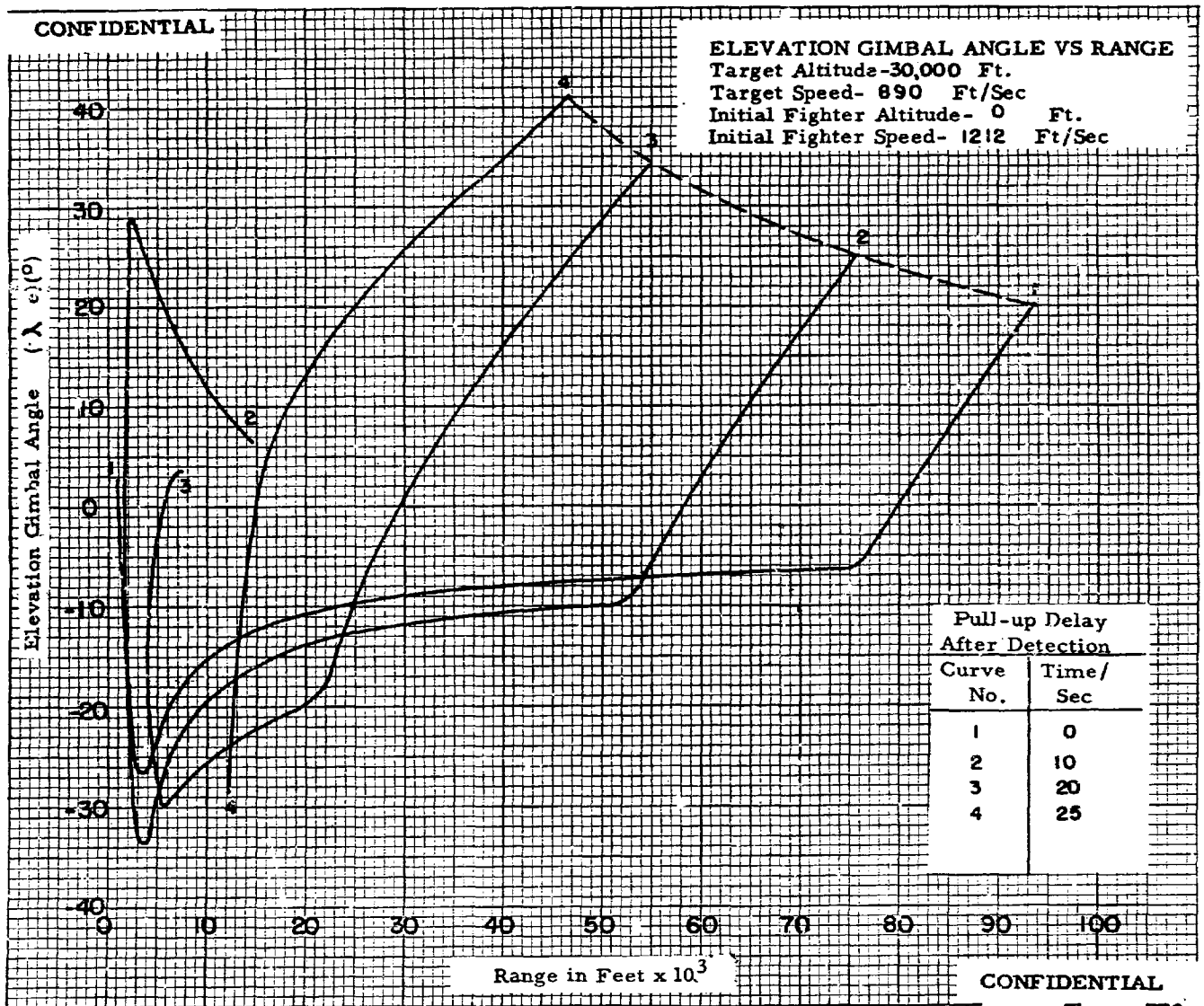


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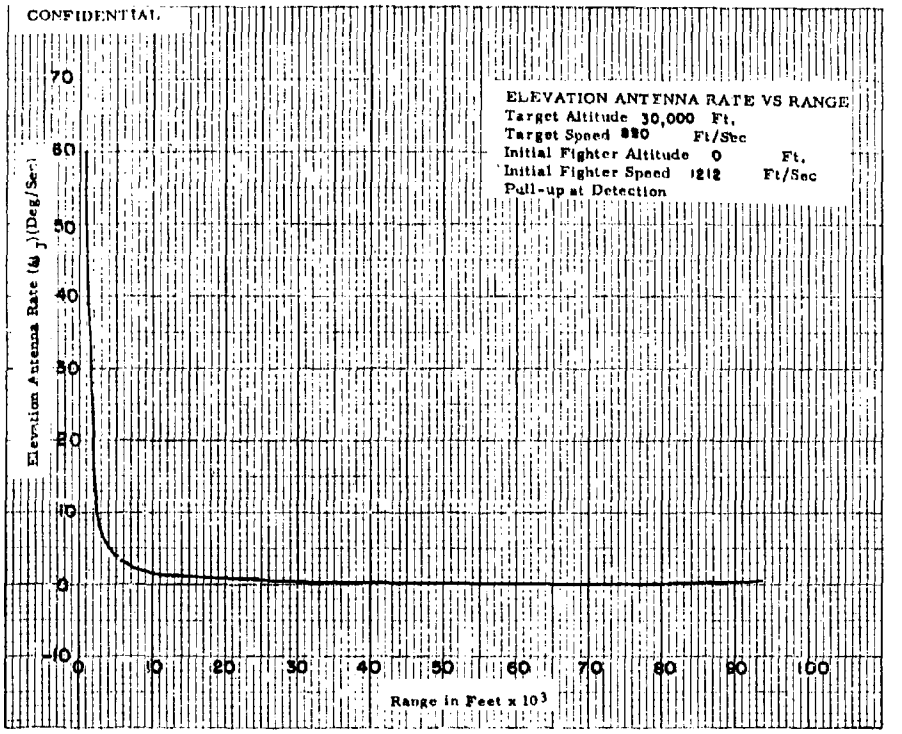
Figure 779


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up at Detection
Elevation Antenna Rate (ė)(Deg/Sec)
70
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

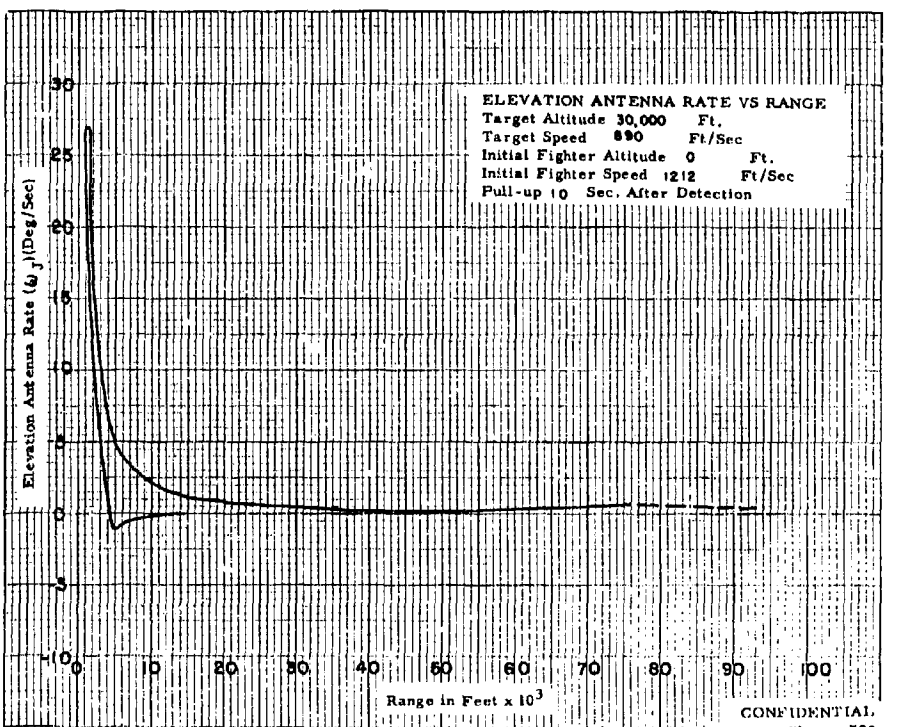
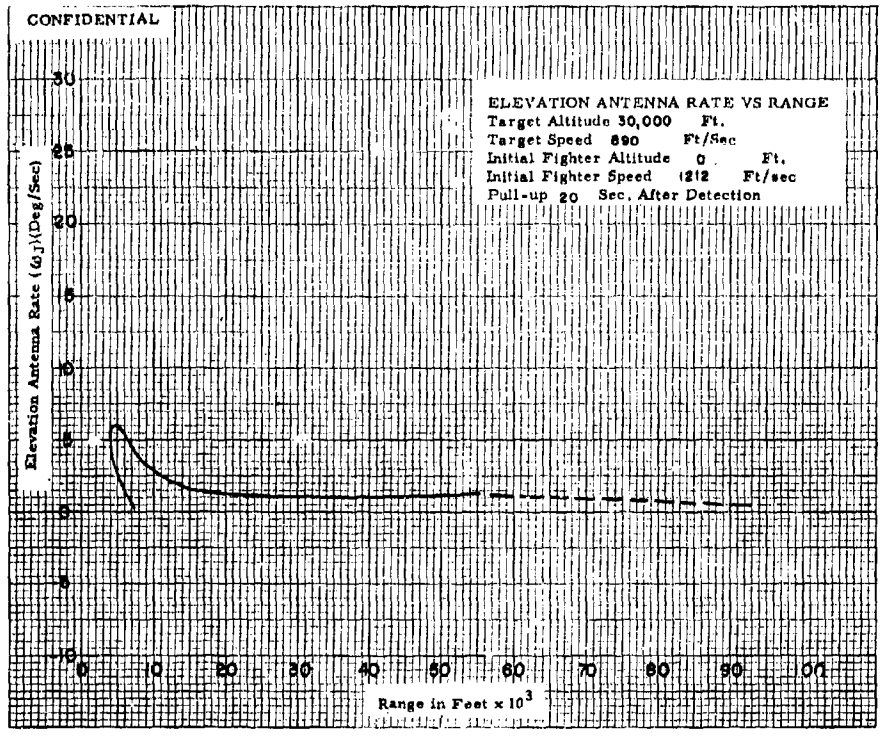

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 10 Sec. After Detection
Elevation Antenna Rate (ė)(Deg/Sec)
30
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 780

CONFIDENTIAL



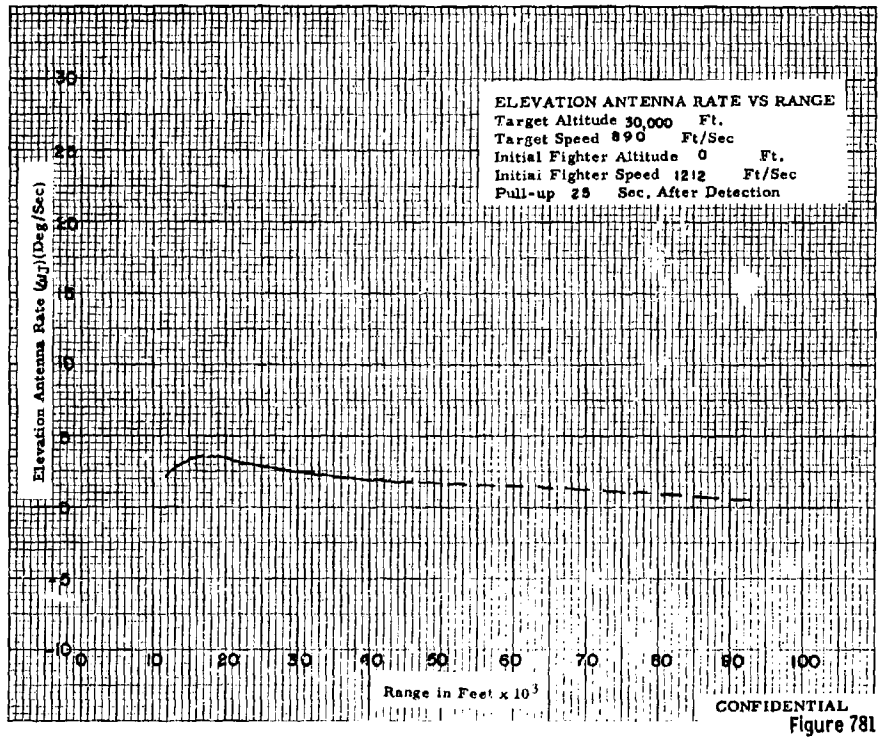


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Figure 781

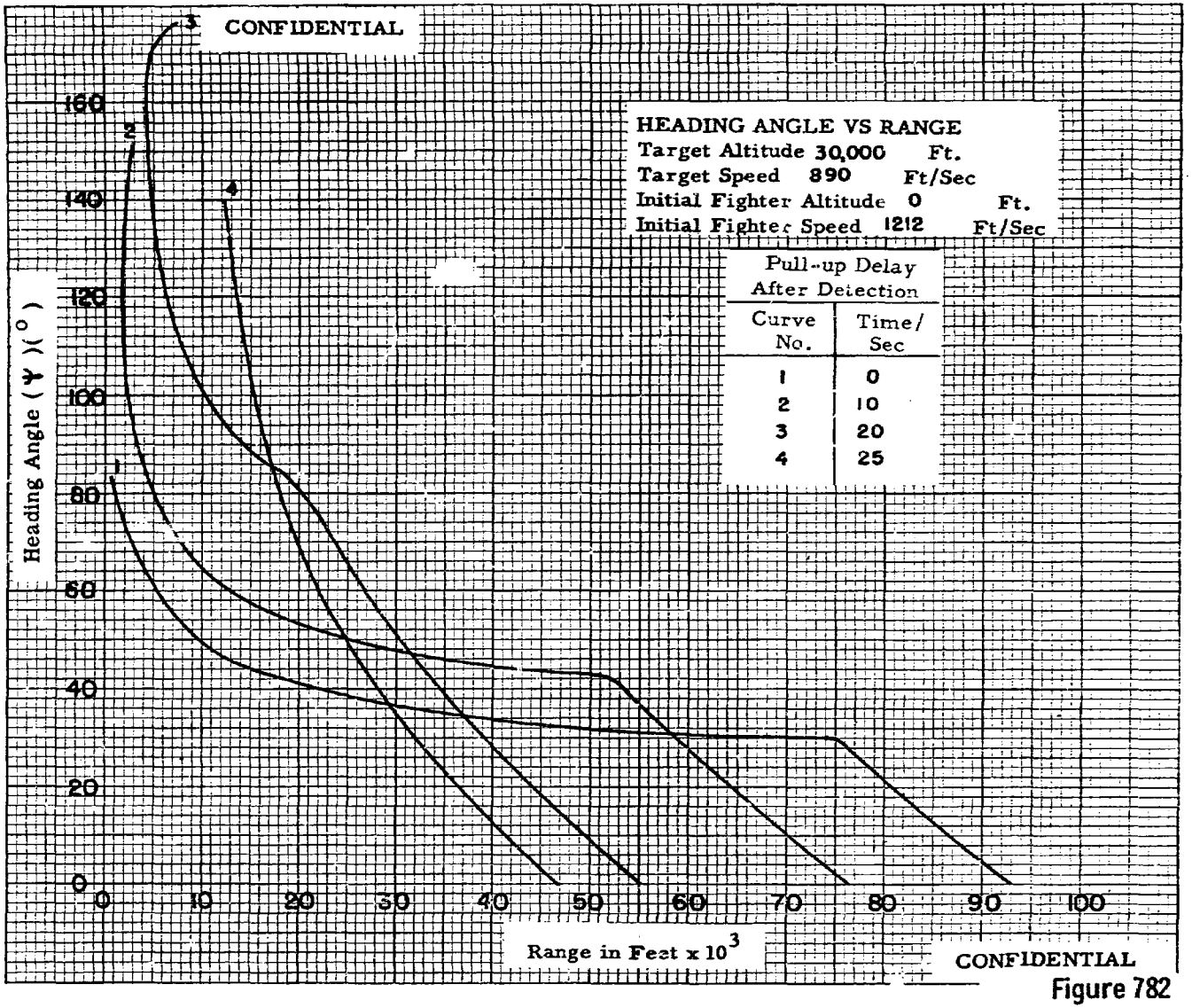
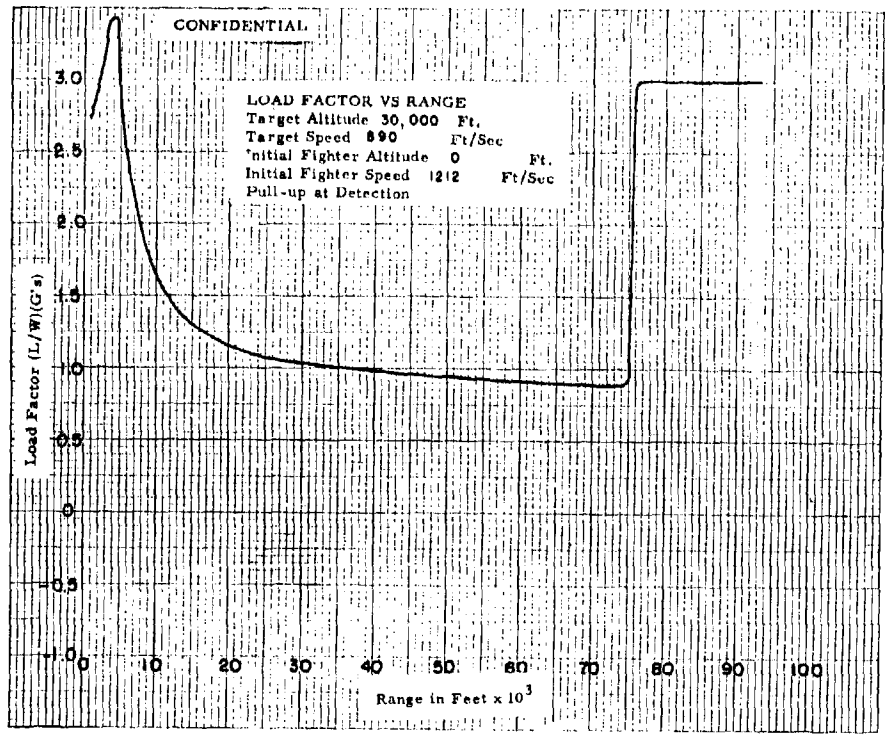

CONFIDENTIAL
HEADING ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 20
4 | 25
Heading Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 782


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up at Detection
Load Factor (L/W)(G's)
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

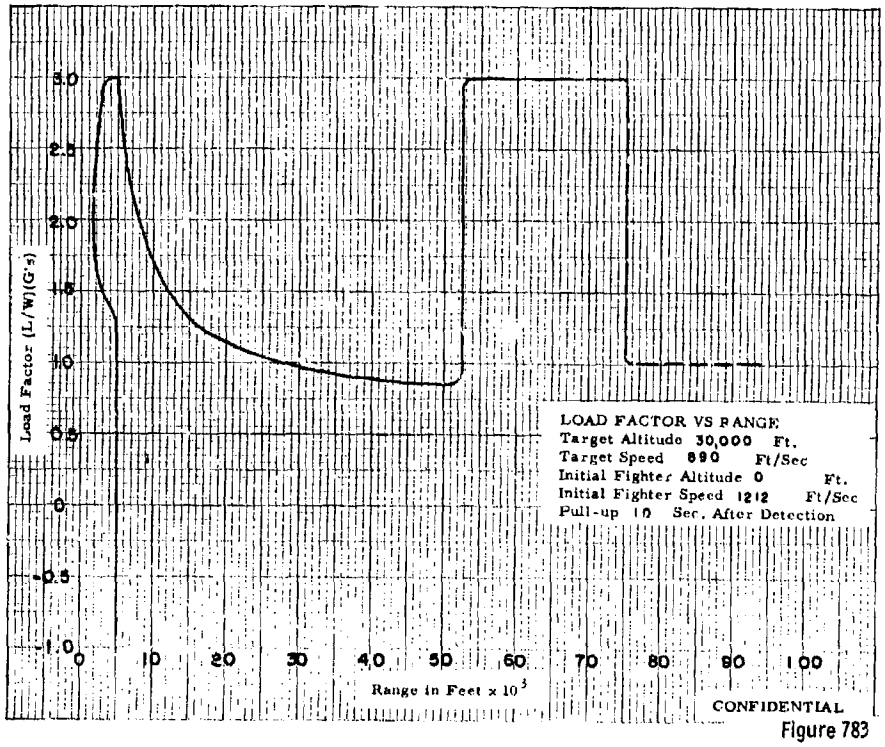
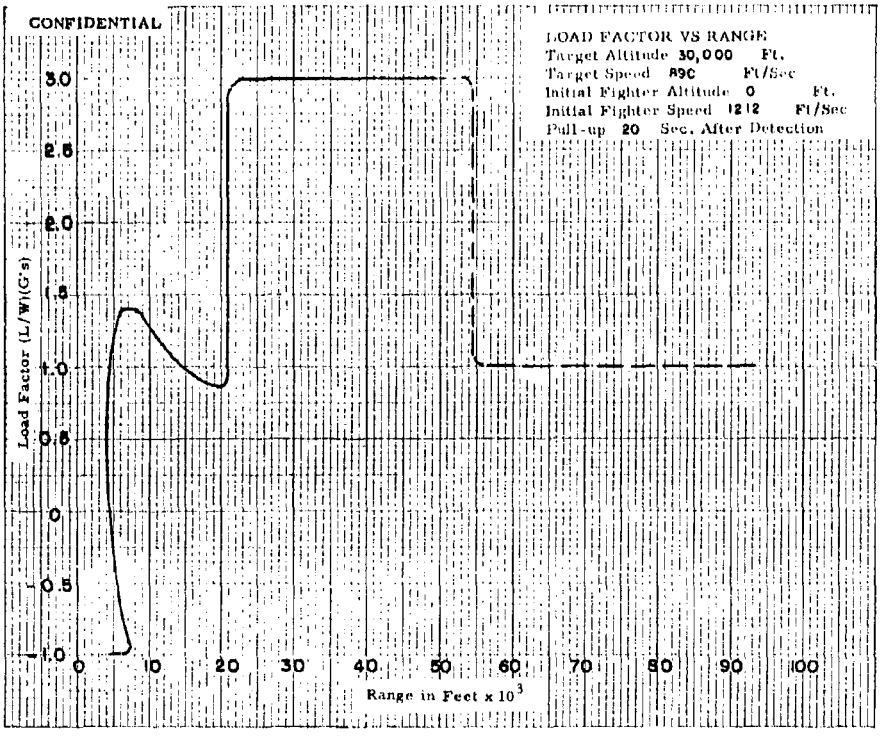

Load Factor (L/W)(G's)
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 10 Sec. After Detection
CONFIDENTIAL

Figure 783


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 20 Sec. After Detection
Load Factor (L/W)(G's)
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

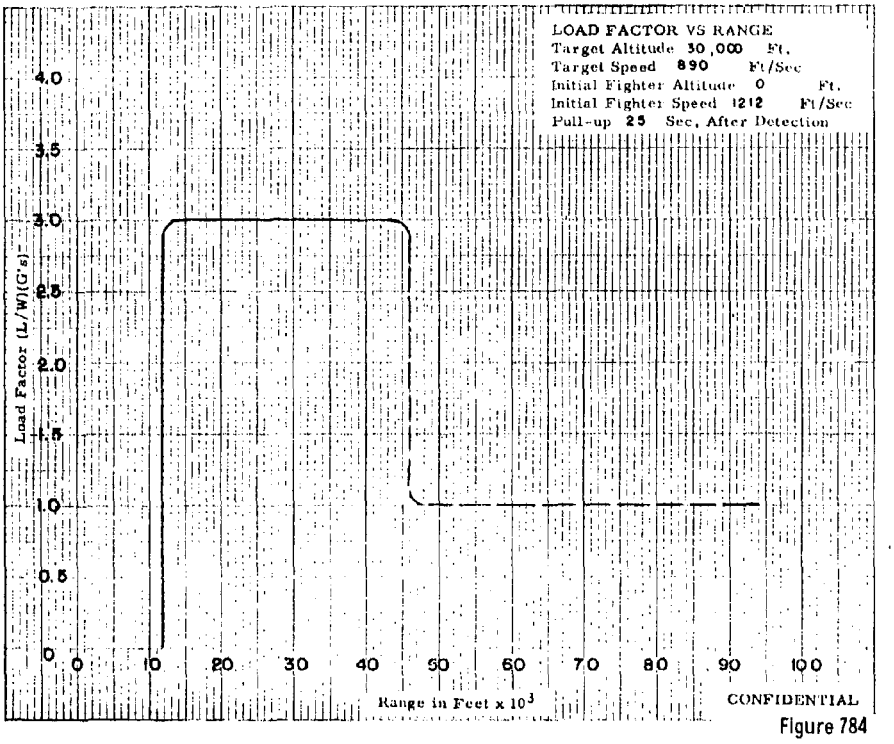
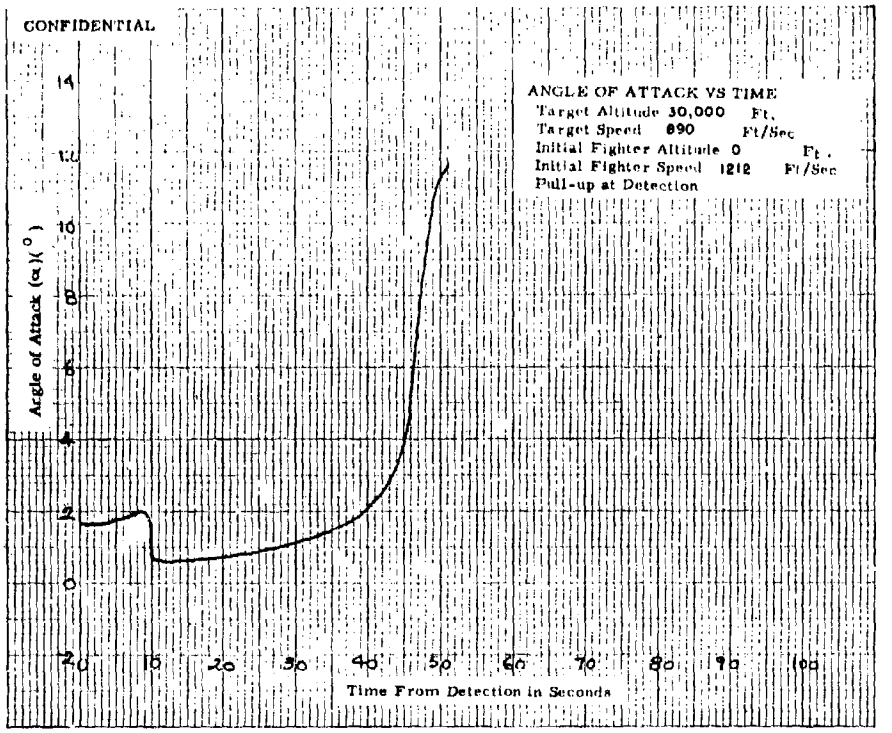

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 25 Sec. After Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3
CONFIDENTIAL

Figure 784


ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up at Detection
Angle of Attack (α)(°)
Time From Detection in Seconds

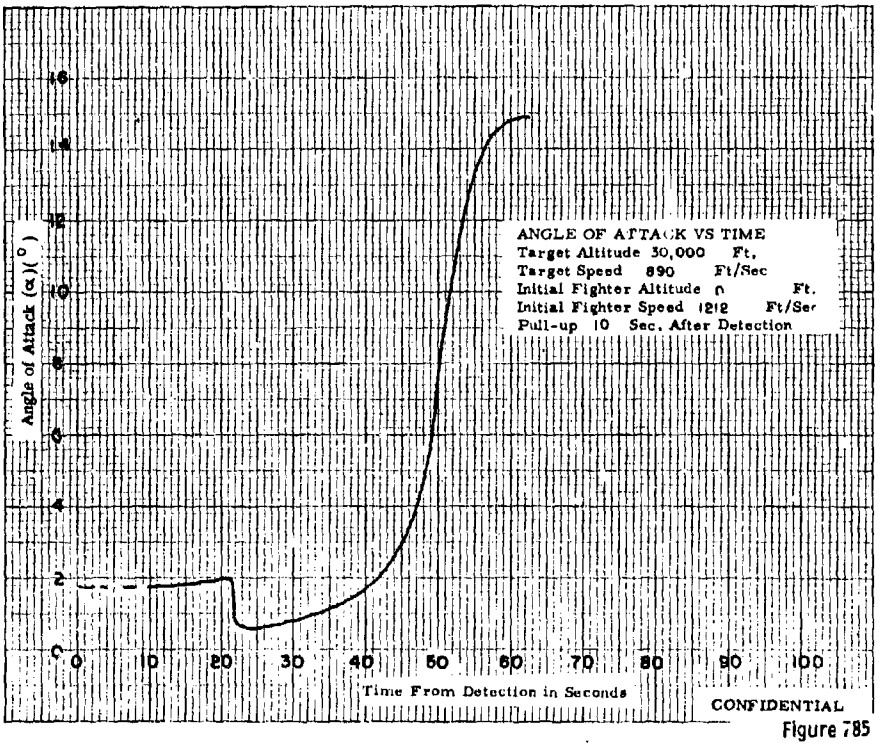
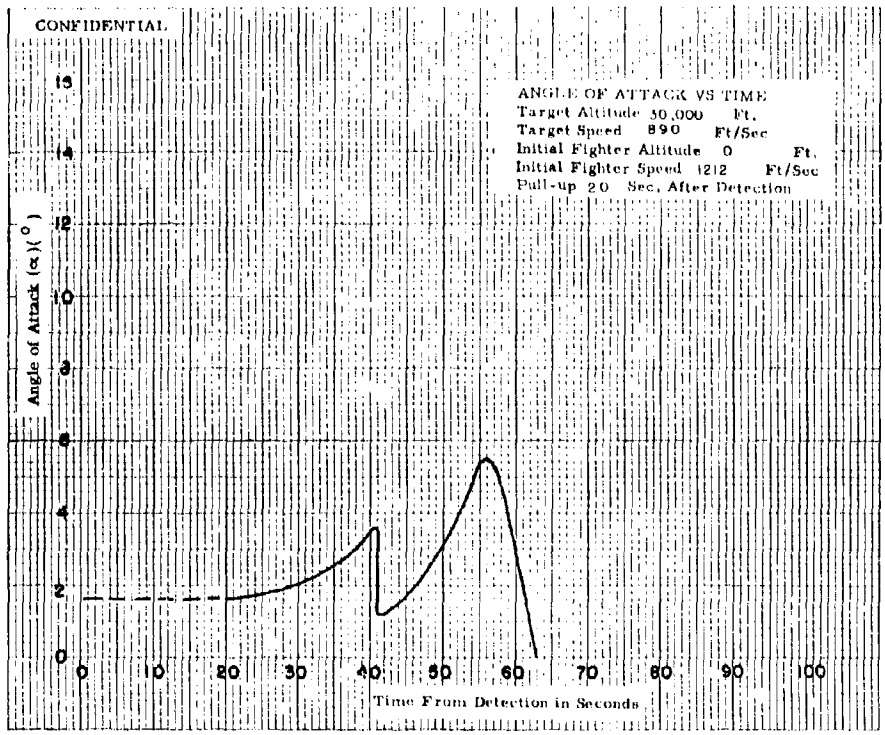

ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 10 Sec. After Detection
Angle of Attack (α)(°)
Time From Detection in Seconds

Figure 785


ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 20 Sec. After Detection
Angle of Attack (α)(°)
Time From Detection in Seconds

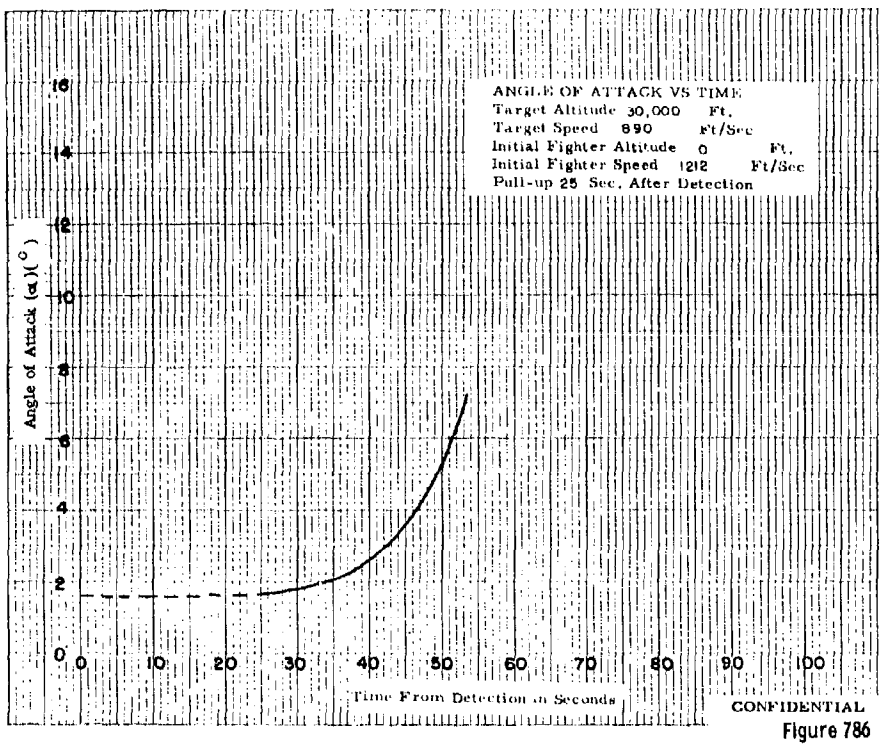

ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 25 Sec. After Detection
Angle of Attack (α)(°)
Time From Detection in Seconds

Figure 786

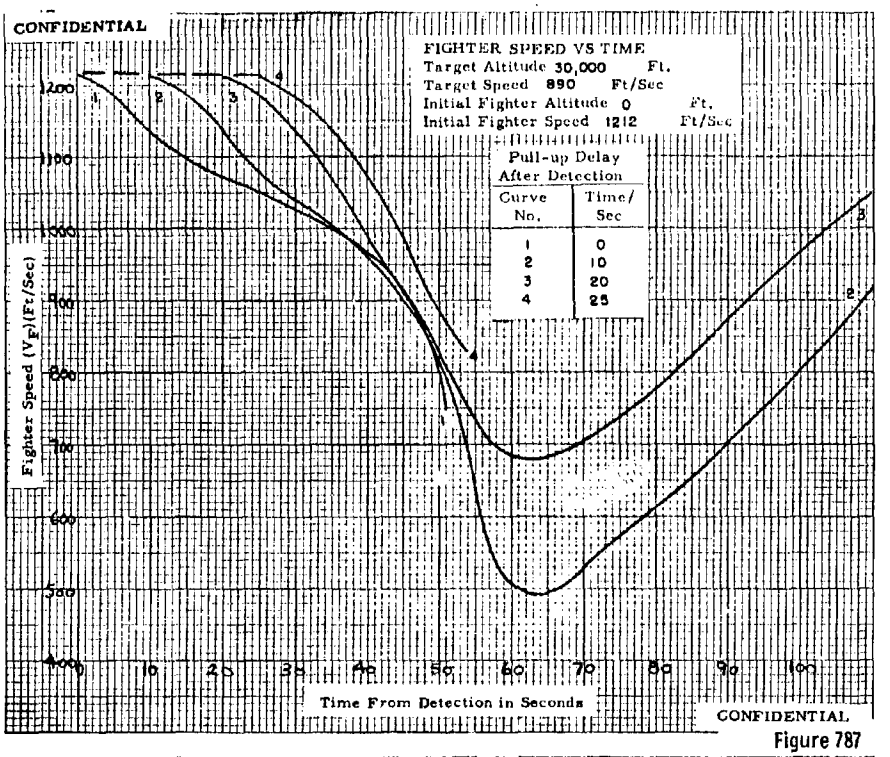


Figure 787

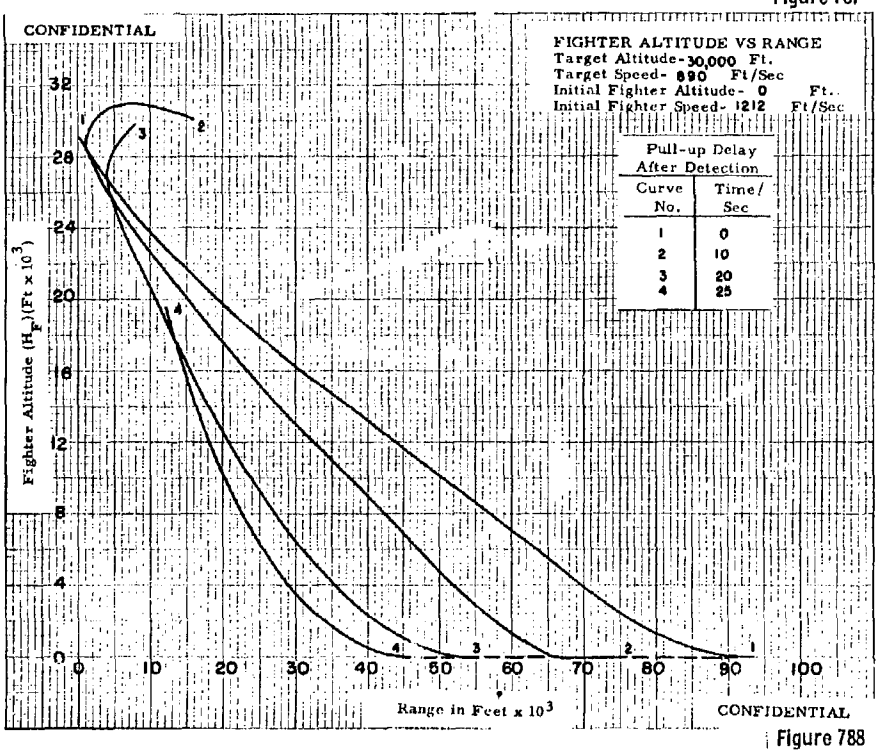
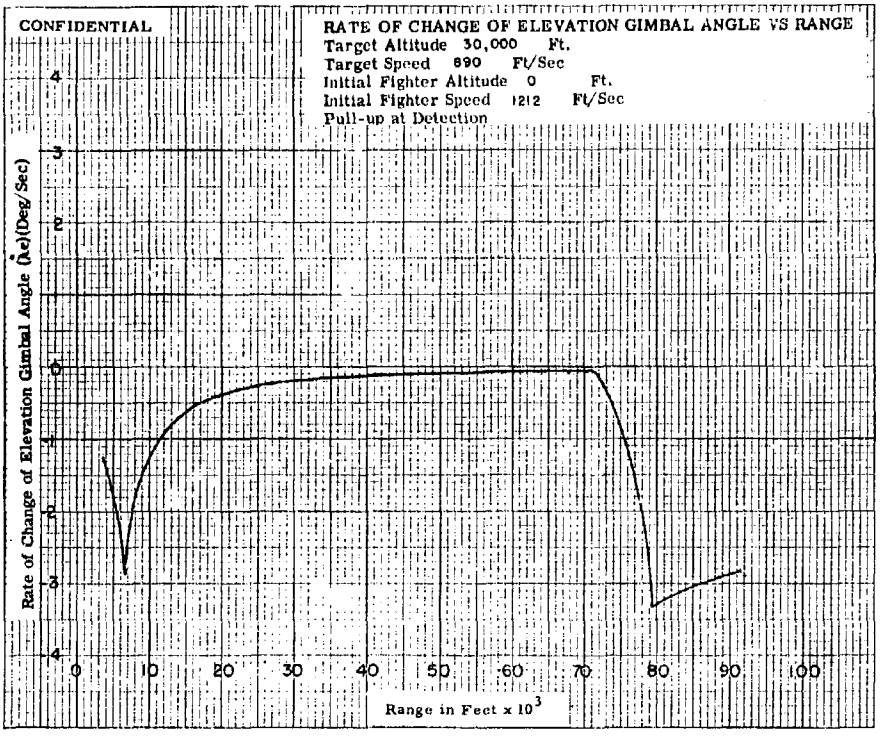


Figure 788


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
Range in Feet x 10^3

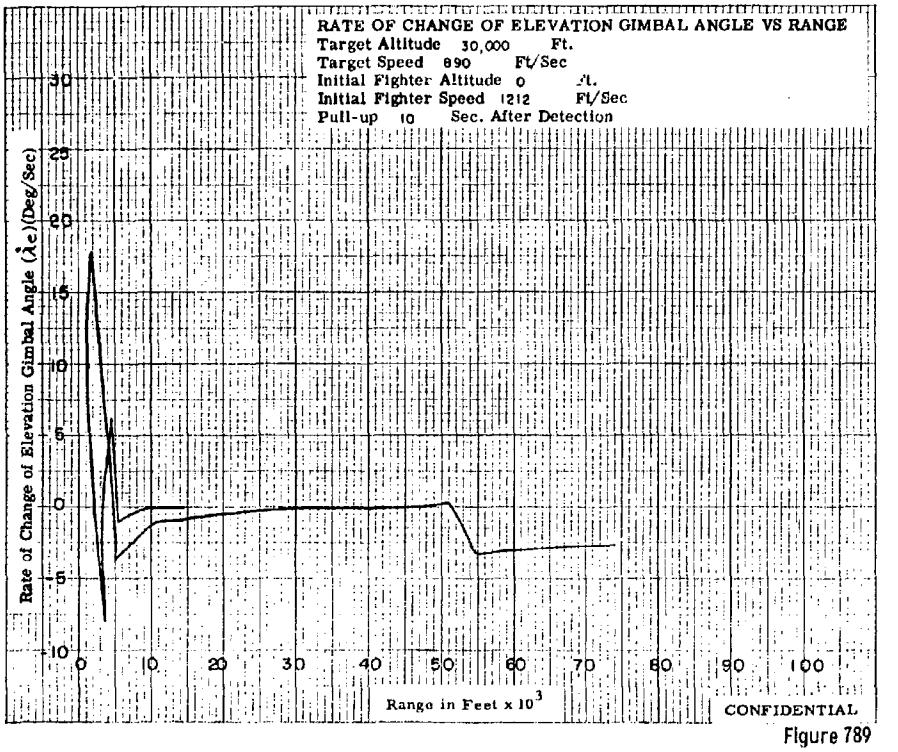
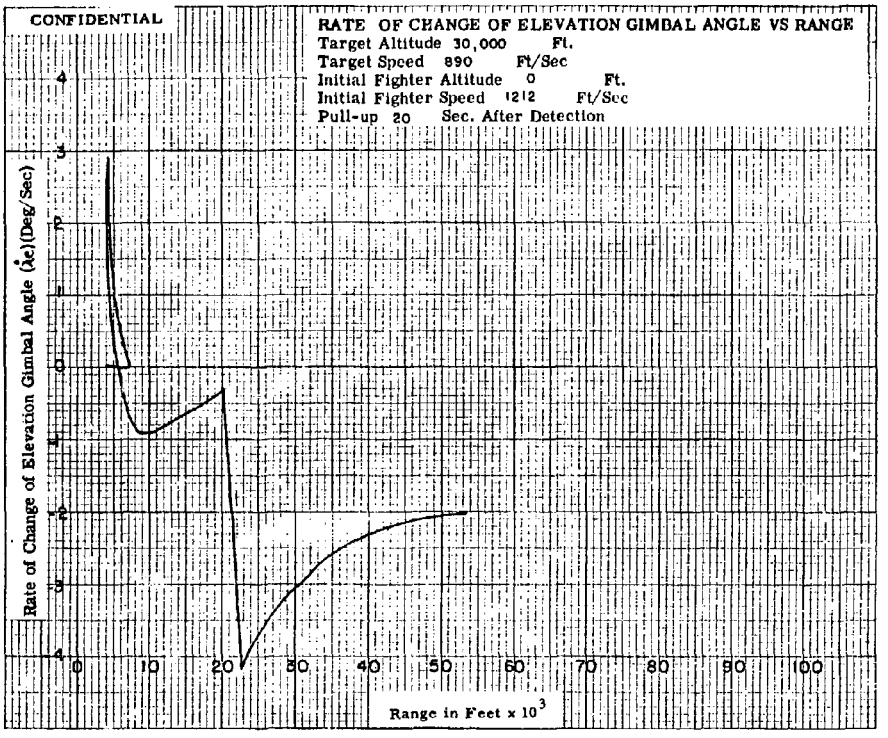

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
Range in Feet x 10^3
CONFIDENTIAL

Figure 789


CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 20 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
4
3
2
1
0
-1
-2
-3
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

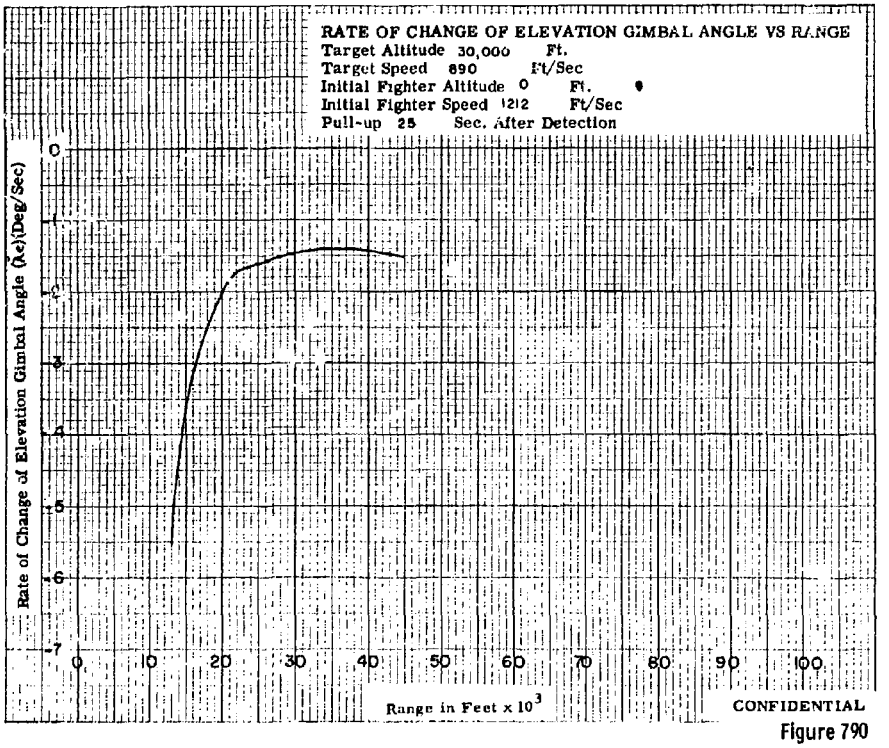
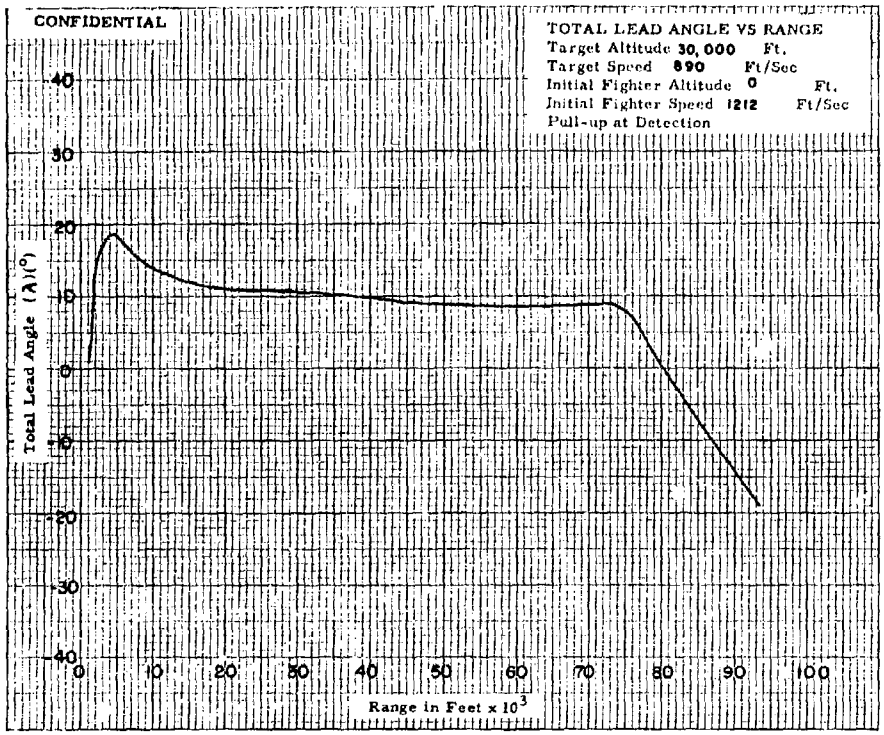

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 25 Sec. After Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
0
-1
-2
-3
-4
-5
-6
-7
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 790


TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up at Detection
Total Lead Angle (λ)(°)
40
30
20
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

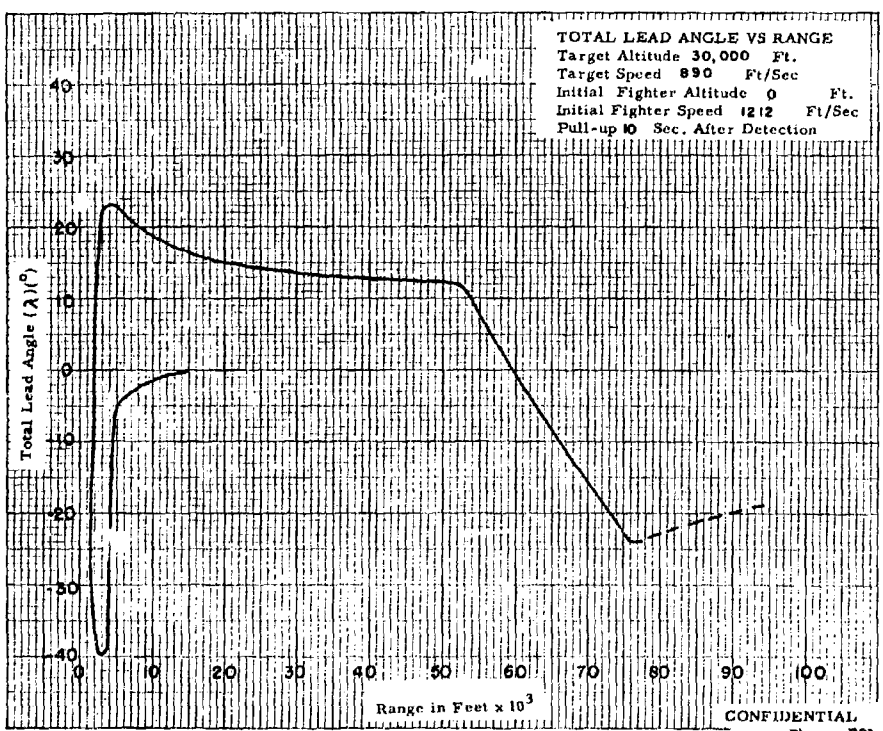
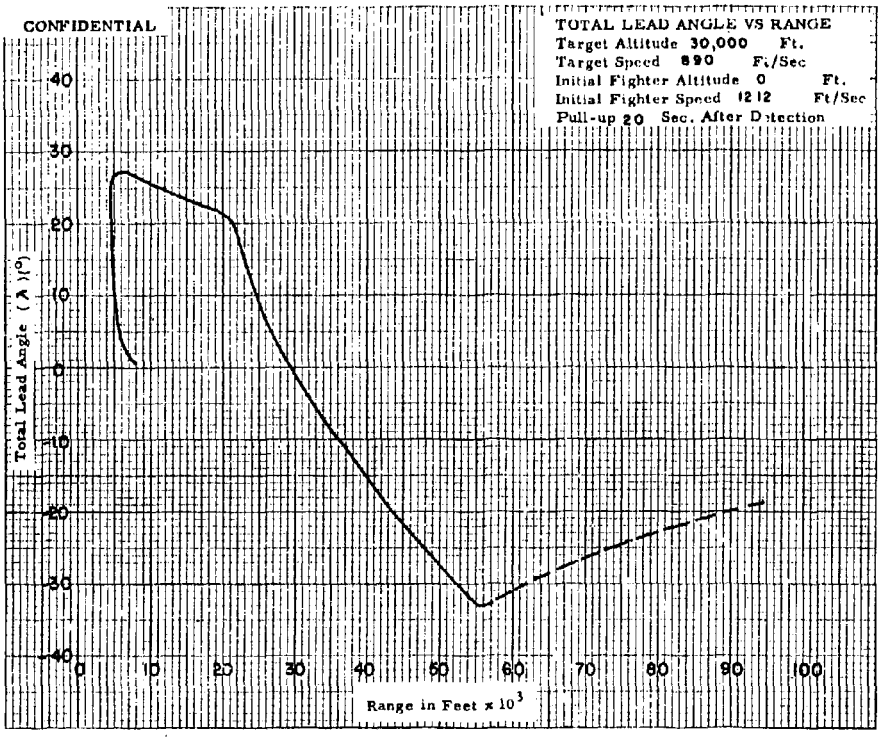

TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 10 Sec. After Detection
Total Lead Angle (λ)(°)
40
30
20
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 791


TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 20 Sec. After Detection
Total Lead Angle (λ)(°)
40
30
20
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

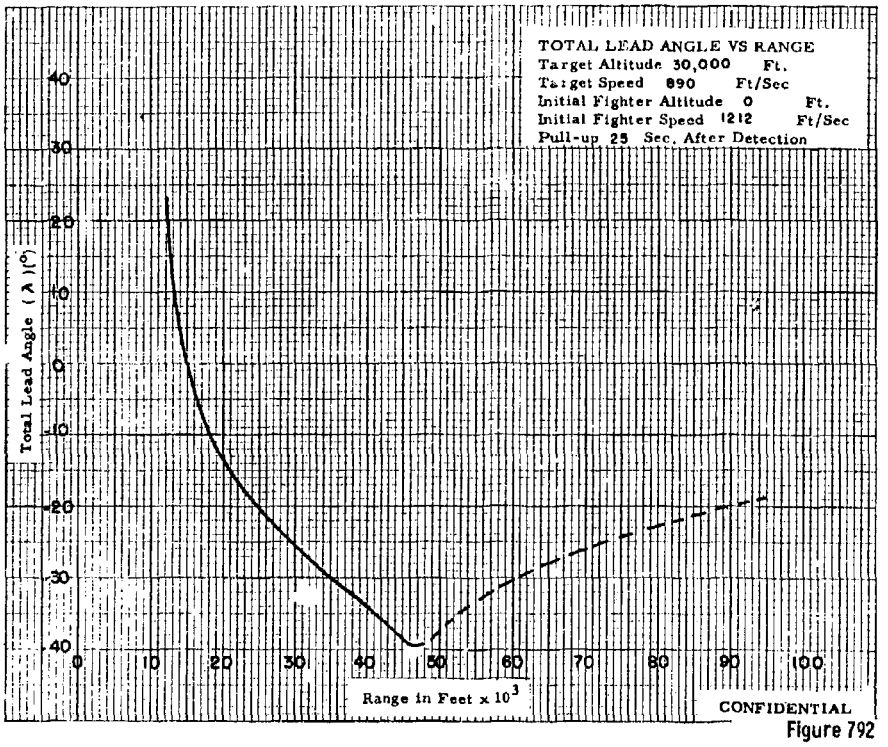
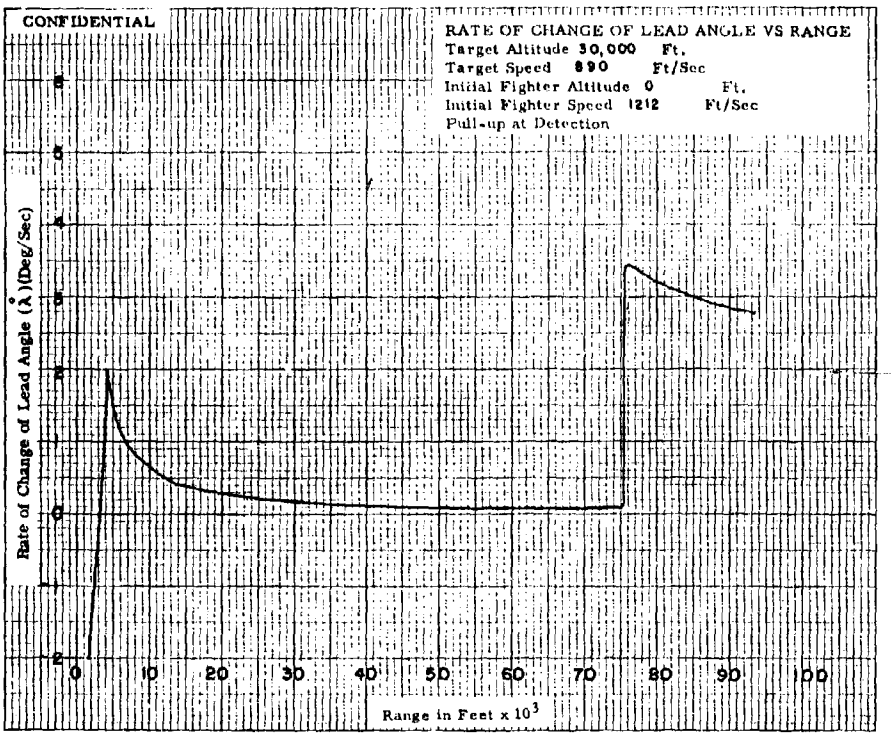

TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 25 Sec. After Detection
Total Lead Angle (λ)(°)
40
30
20
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 792


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
Range in Feet x 10³

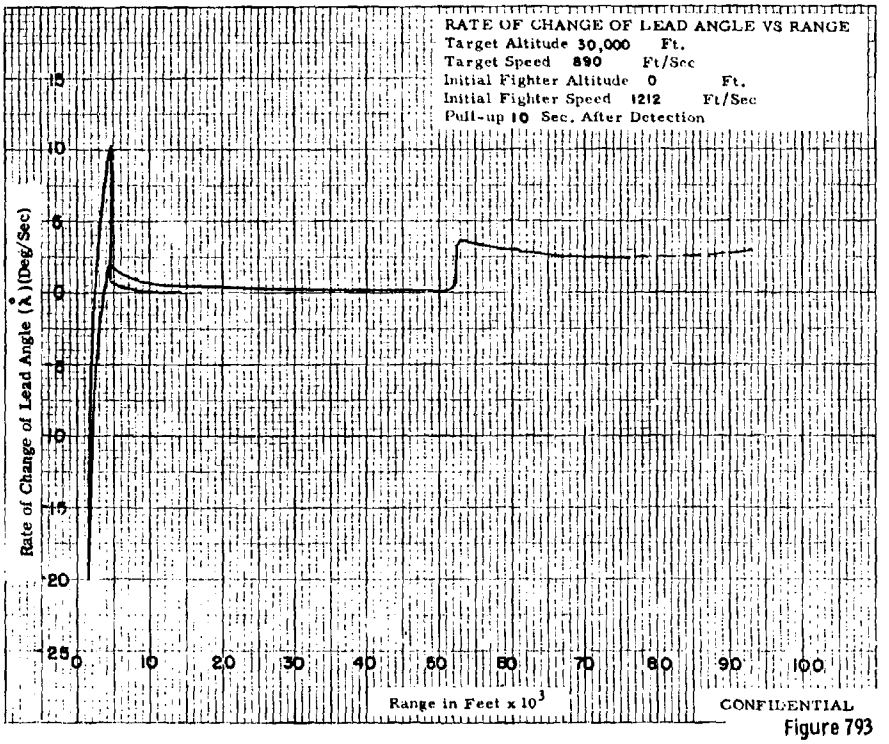
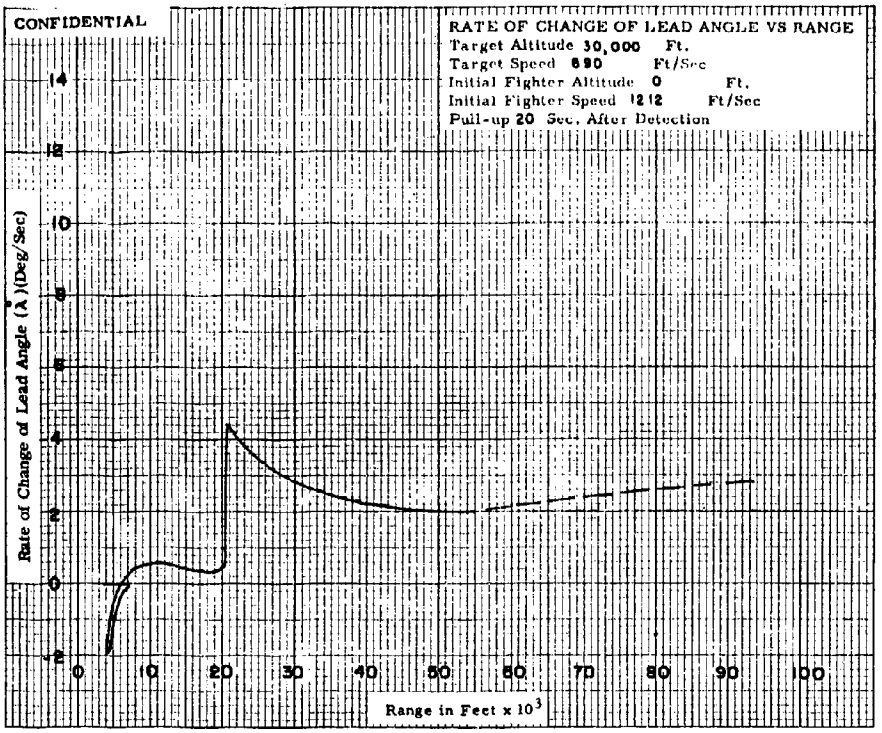
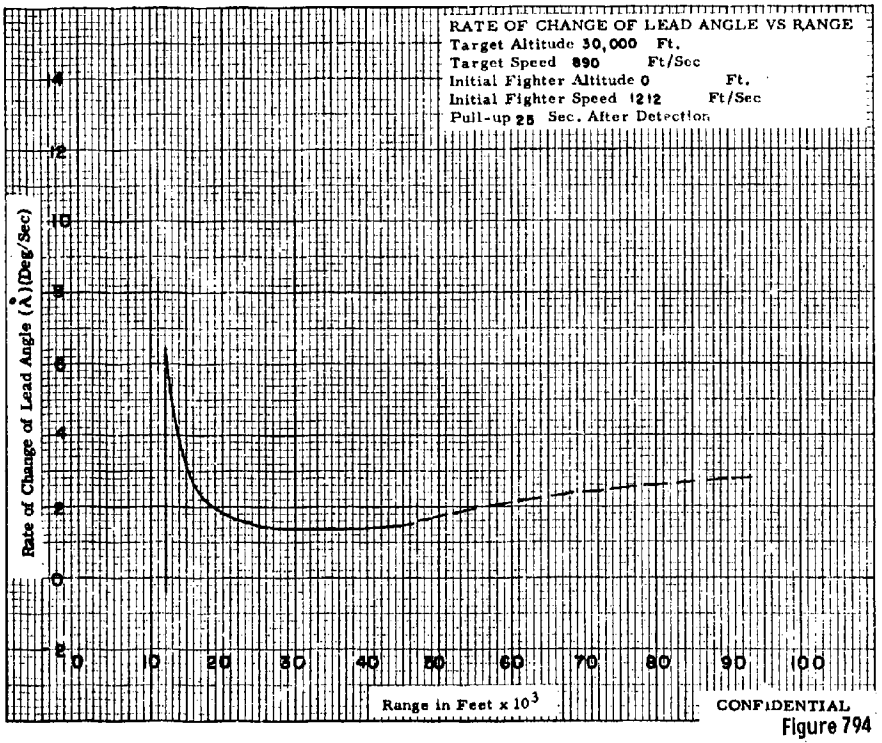

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 890 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 1212 Ft/Sec
Pull-up 10 Sec. After Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
Range in Feet x 10³

Figure 793

CONFIDENTIAL

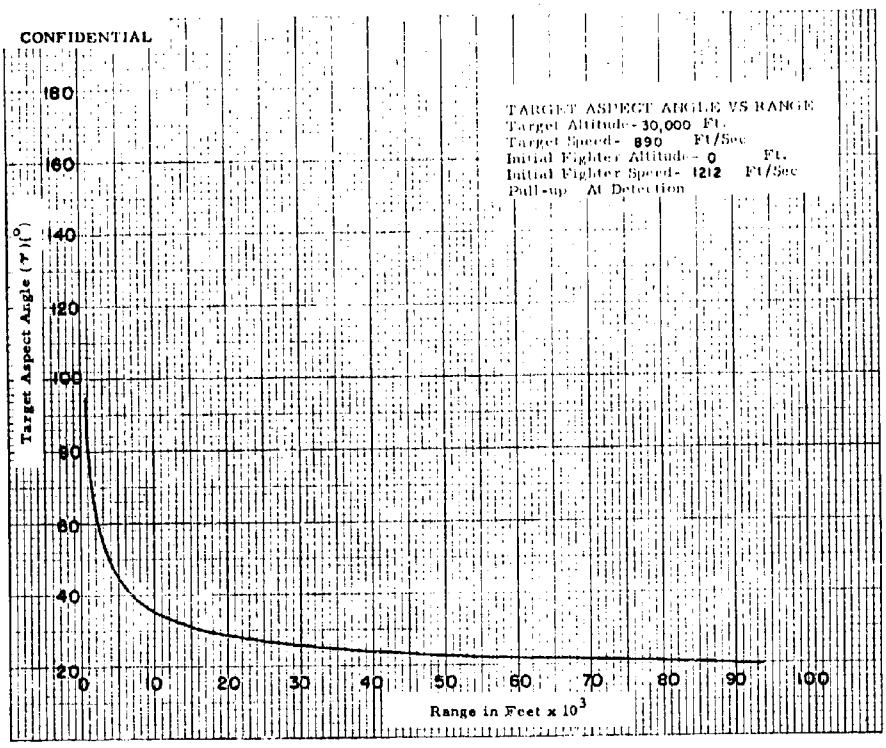


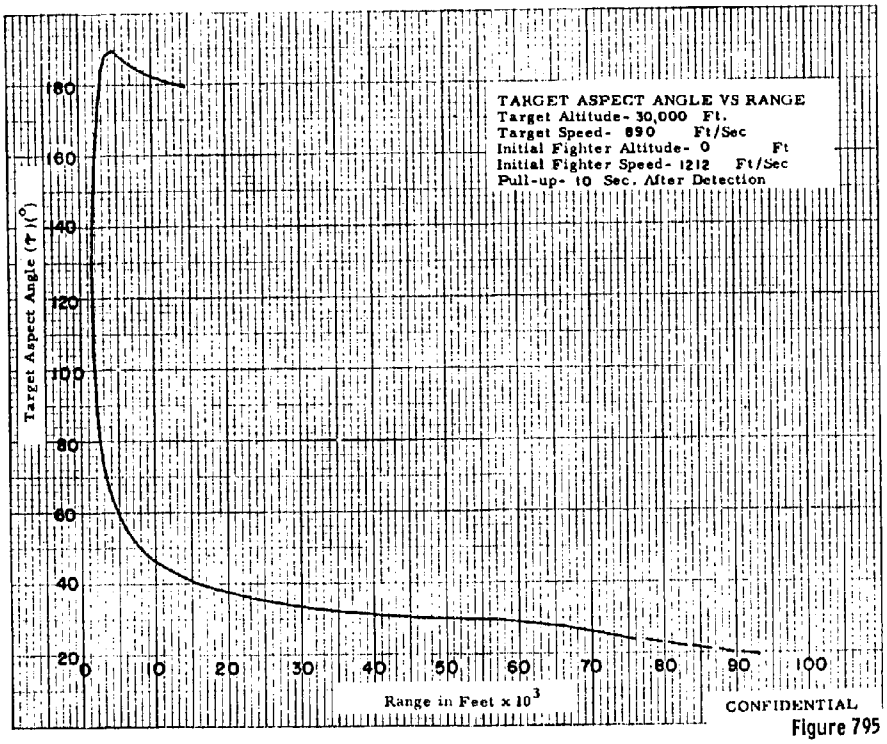


CONFIDENTIAL

Figure 794

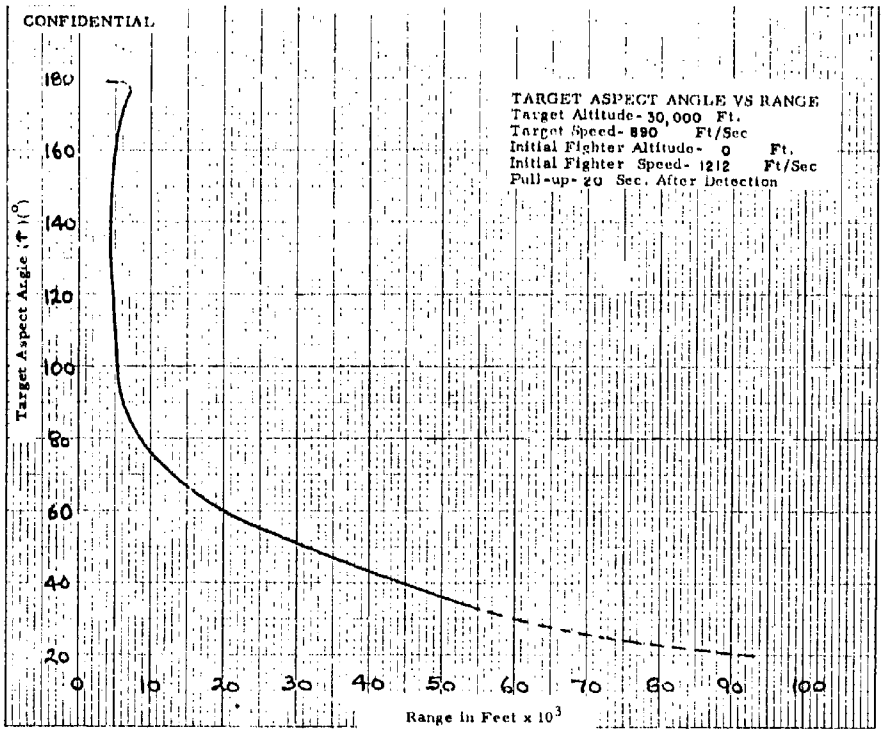
CONFIDENTIAL





CONFIDENTIAL

Figure 795


TARGET ASPECT ANGLE VS RANGE
Target Altitude- 30,000 Ft.
Target Speed- 890 Ft/Sec
Initial Fighter Altitude- 0 Ft.
Initial Fighter Speed- 1212 Ft/Sec
Pull-up- 20 Sec. After Detection
Target Aspect Angle (Ψ)(°)
180
160
140
120
100
80
60
40
20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

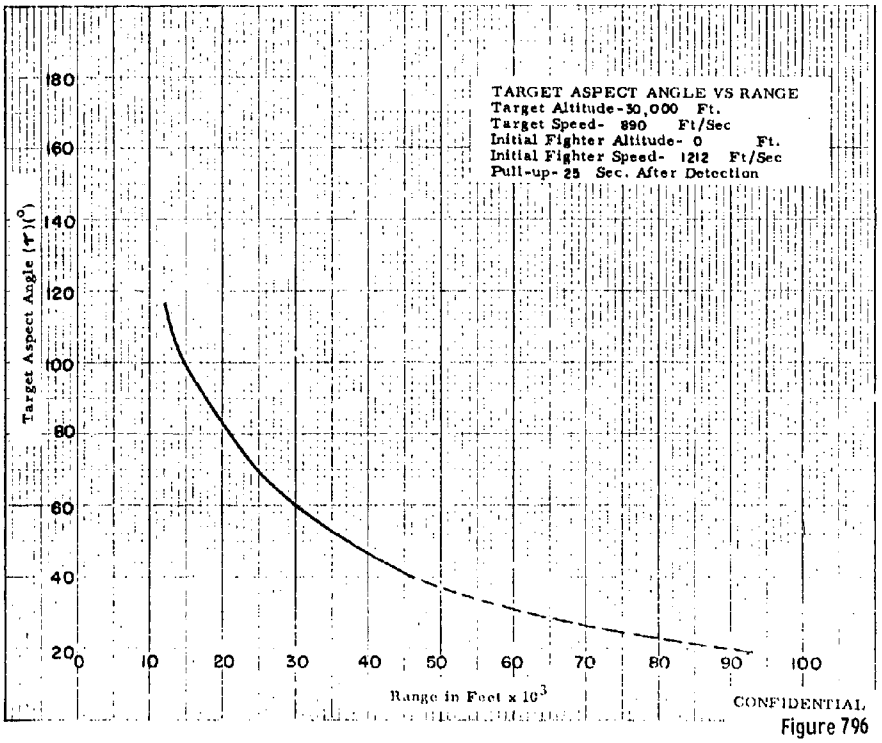
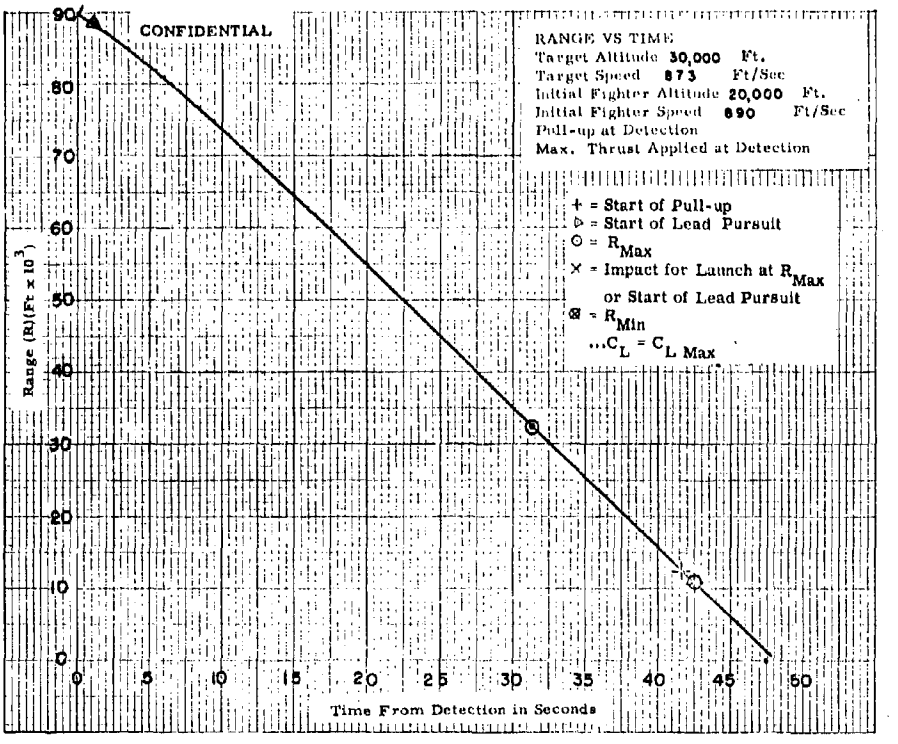

TARGET ASPECT ANGLE VS RANGE
Target Altitude- 30,000 Ft.
Target Speed- 890 Ft/Sec
Initial Fighter Altitude- 0 Ft.
Initial Fighter Speed- 1212 Ft/Sec
Pull-up- 25 Sec. After Detection
Target Aspect Angle (Ψ)(°)
180
160
140
120
100
80
60
40
20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 796


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

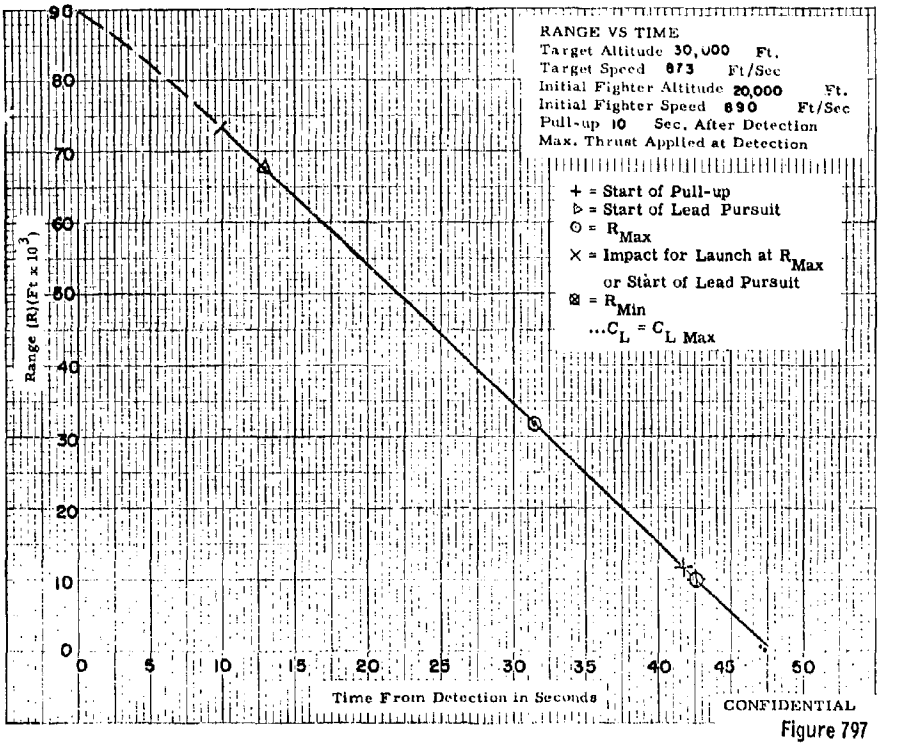
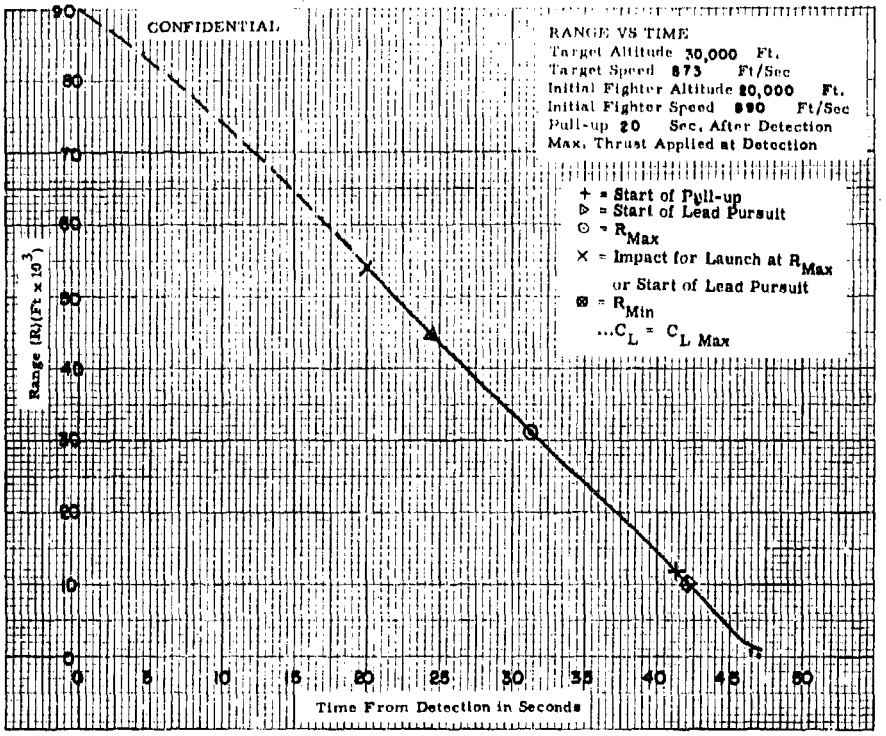

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 797


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

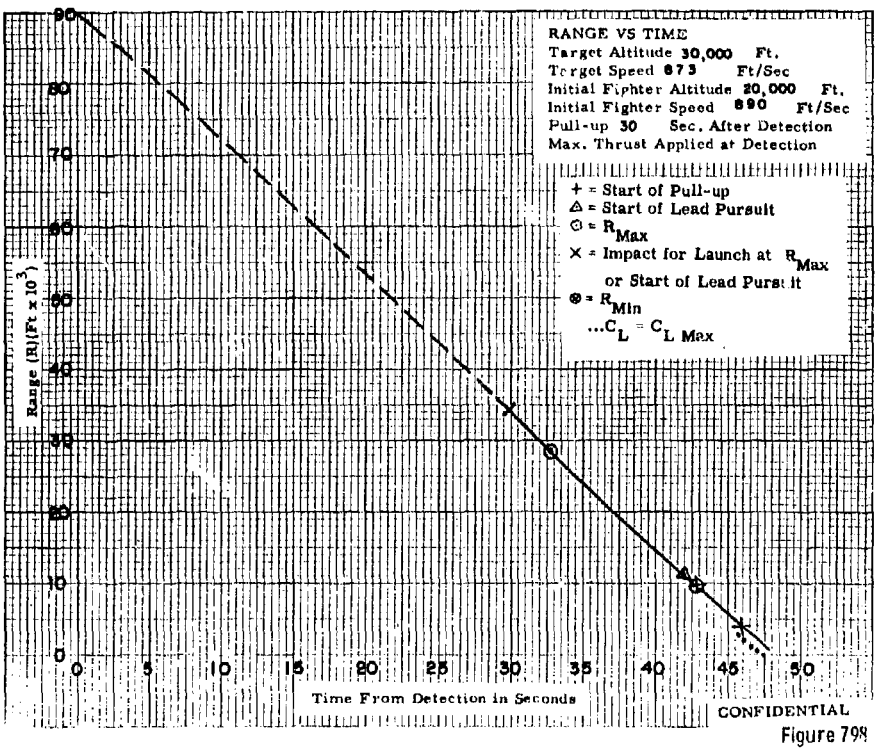

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 798

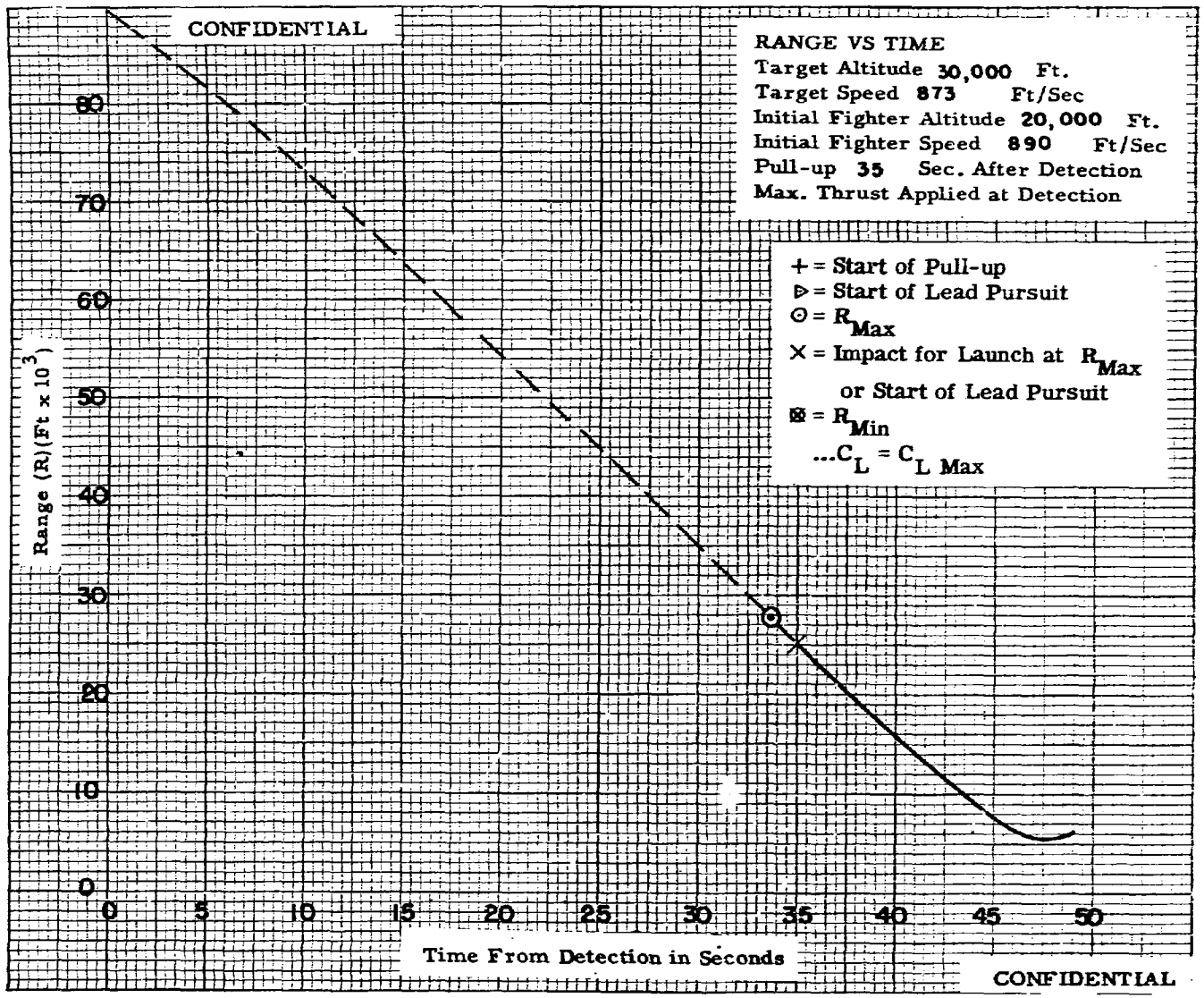
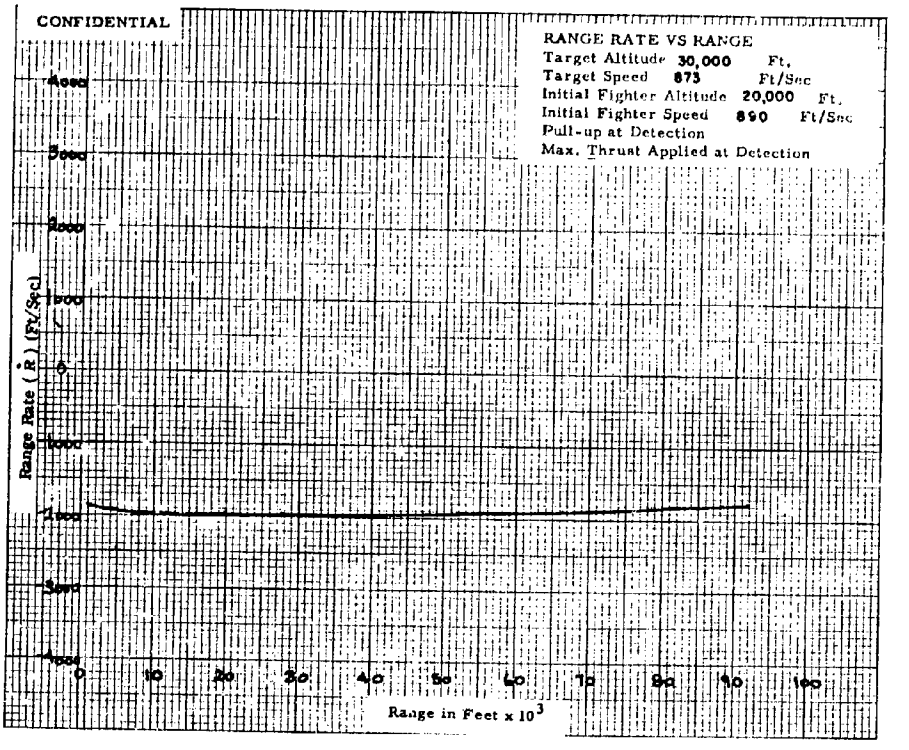

CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
⊳ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds
CONFIDENTIAL

Figure 799


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
Range in Feet x 10³

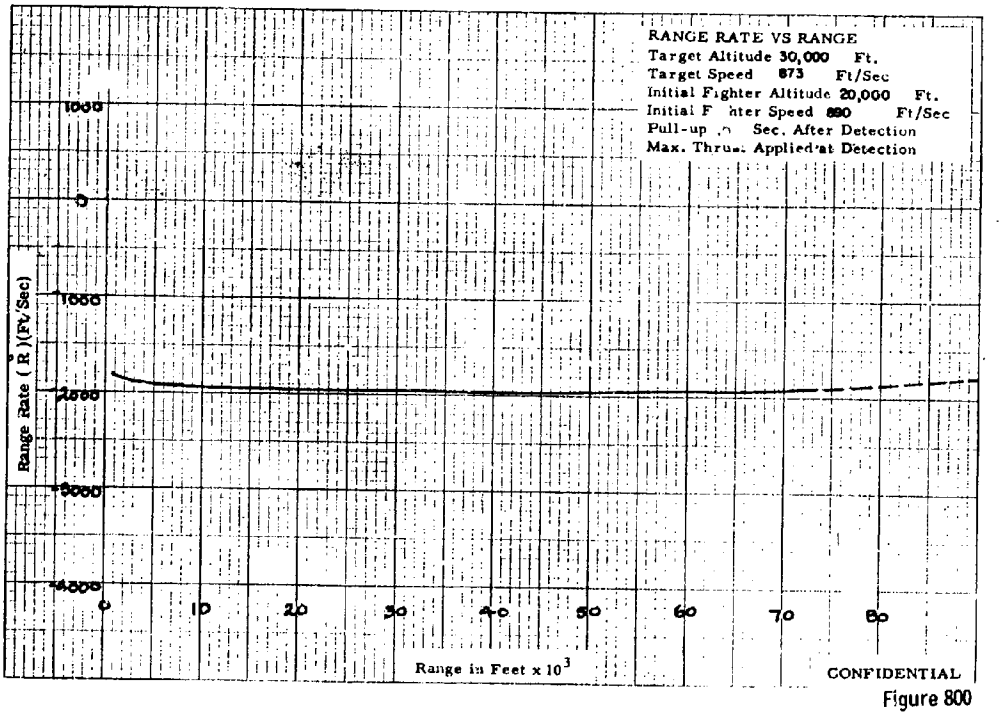
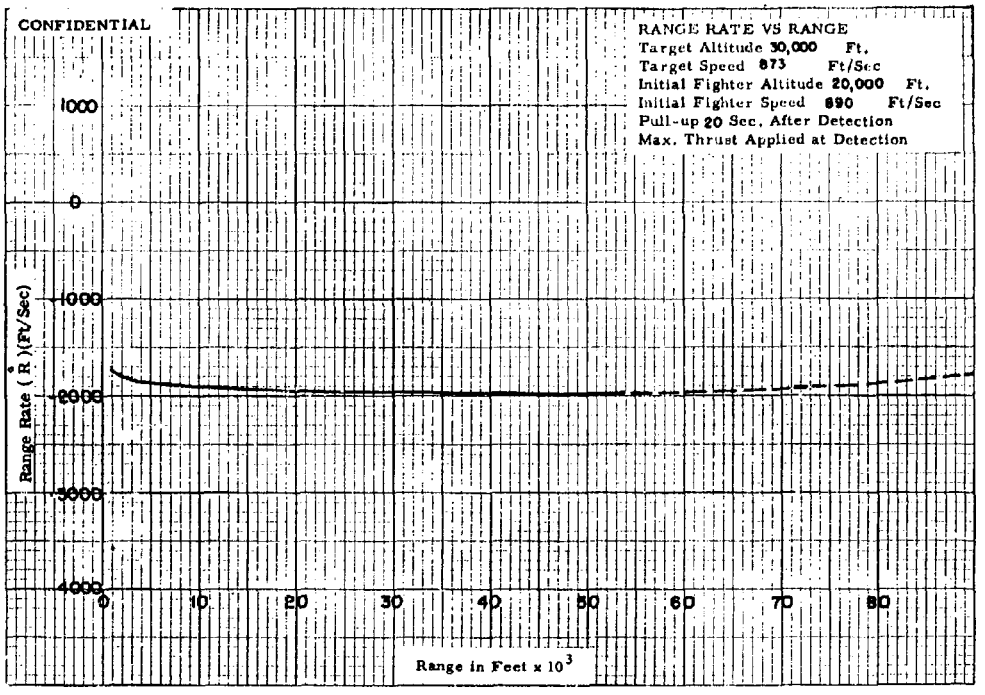

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
Range in Feet x 10³
CONFIDENTIAL

Figure 800


RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
1000
0
-1000
-2000
-3000
-4000
Range Rate (Ṙ) (Ft/Sec)
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

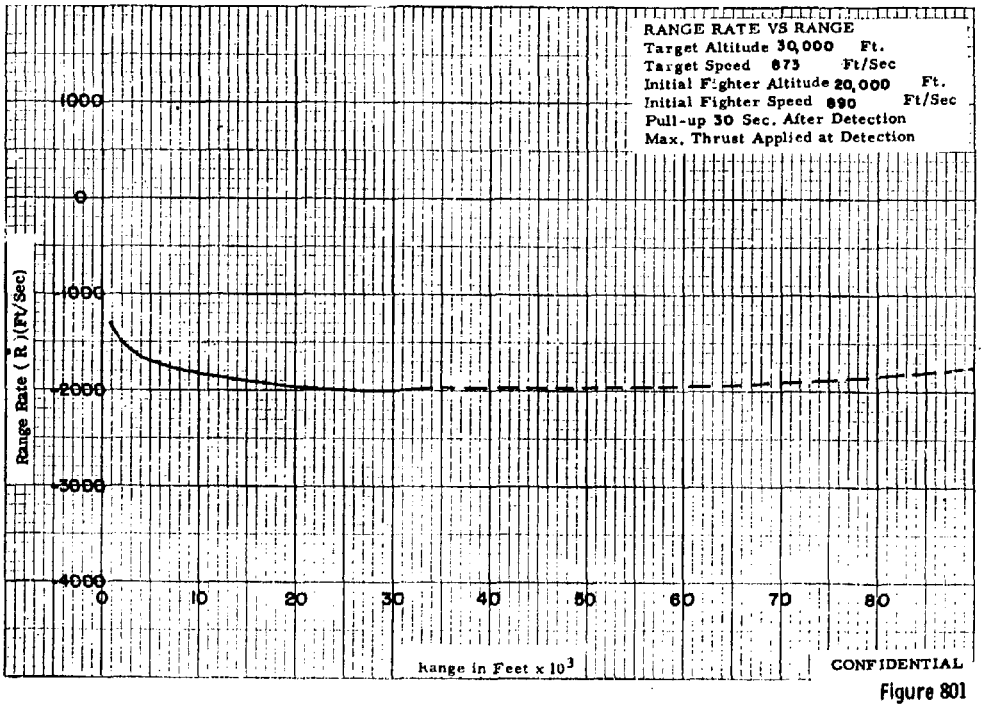

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
1000
0
-1000
-2000
-3000
-4000
Range Rate (Ṙ) (Ft/Sec)
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

Figure 801

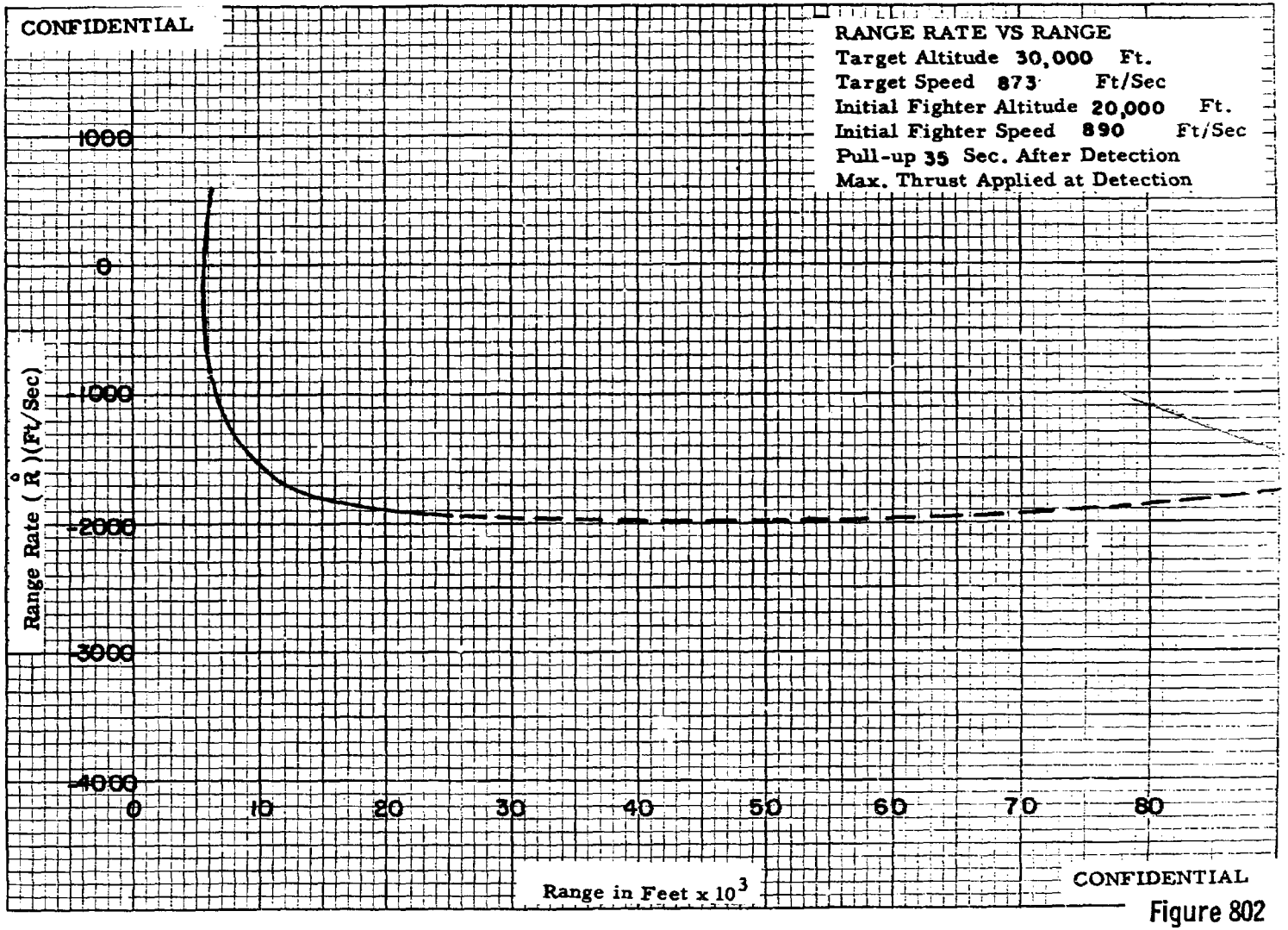
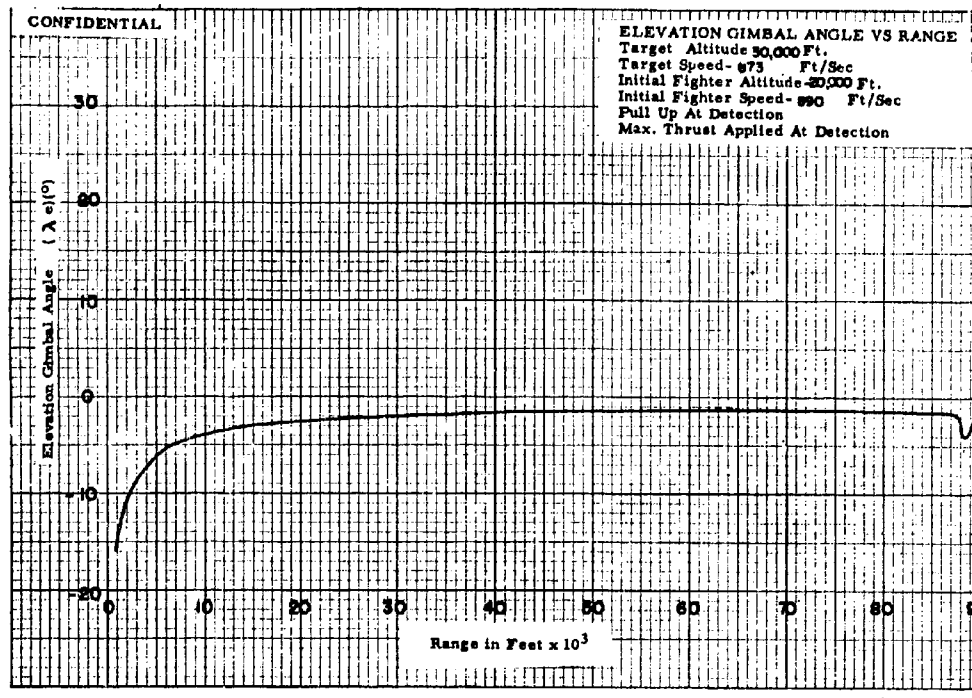

CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
1000
0
-1000
-2000
-3000
-4000
Range Rate (Ṙ) (Ft/Sec)
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 802


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 50,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull Up At Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λ e)(°)
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10³

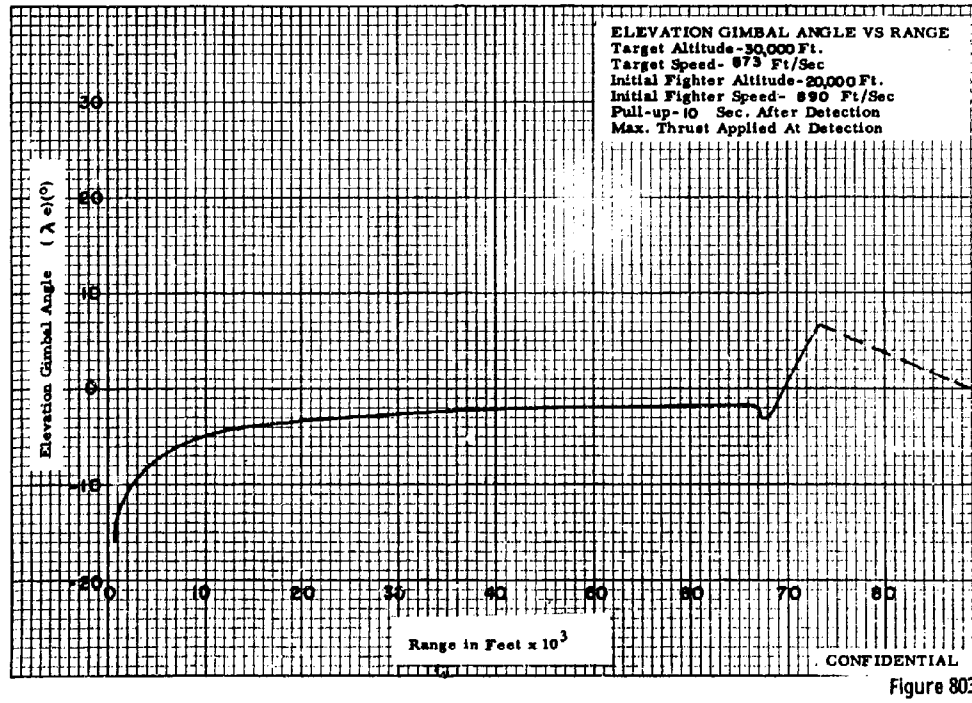
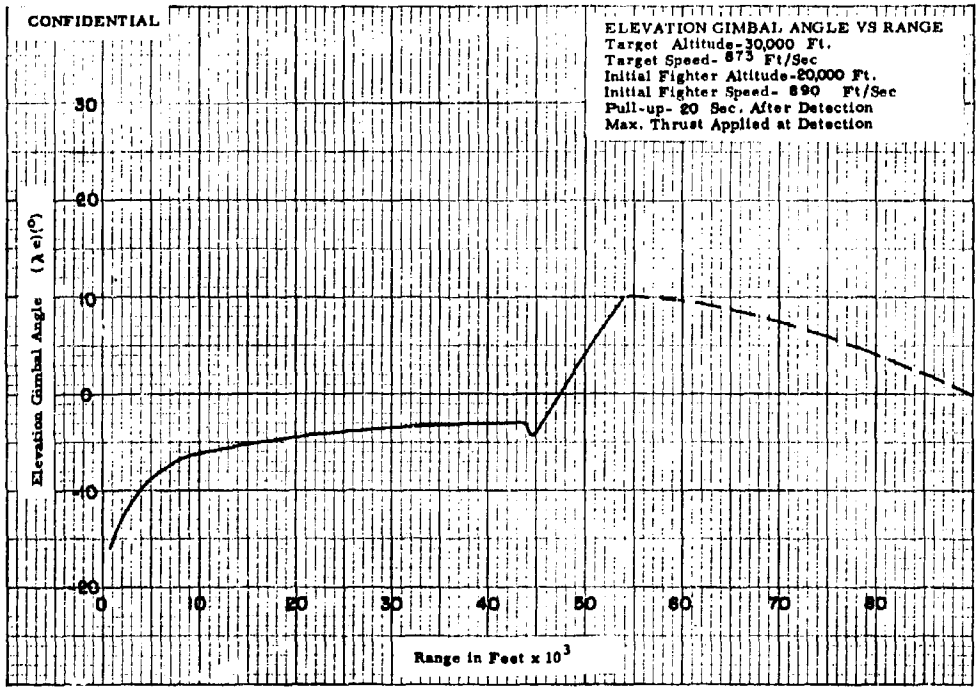

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up-10 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λ e)(°)
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

Figure 803


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Gimbal Angle (λe)(°)
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

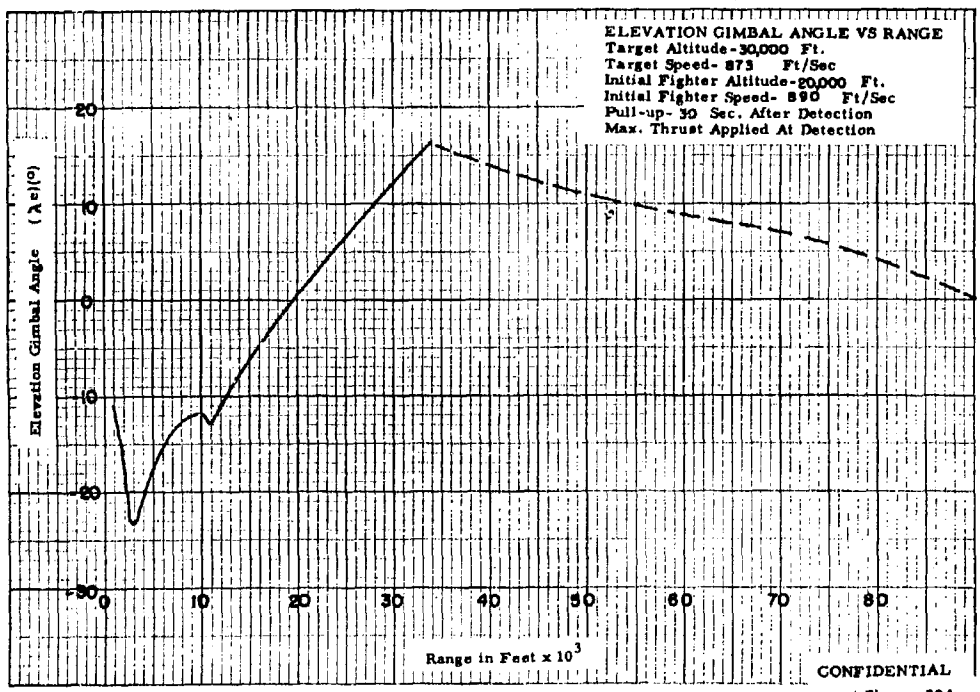

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up- 30 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
20
10
0
-10
-20
-30
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

Figure 804

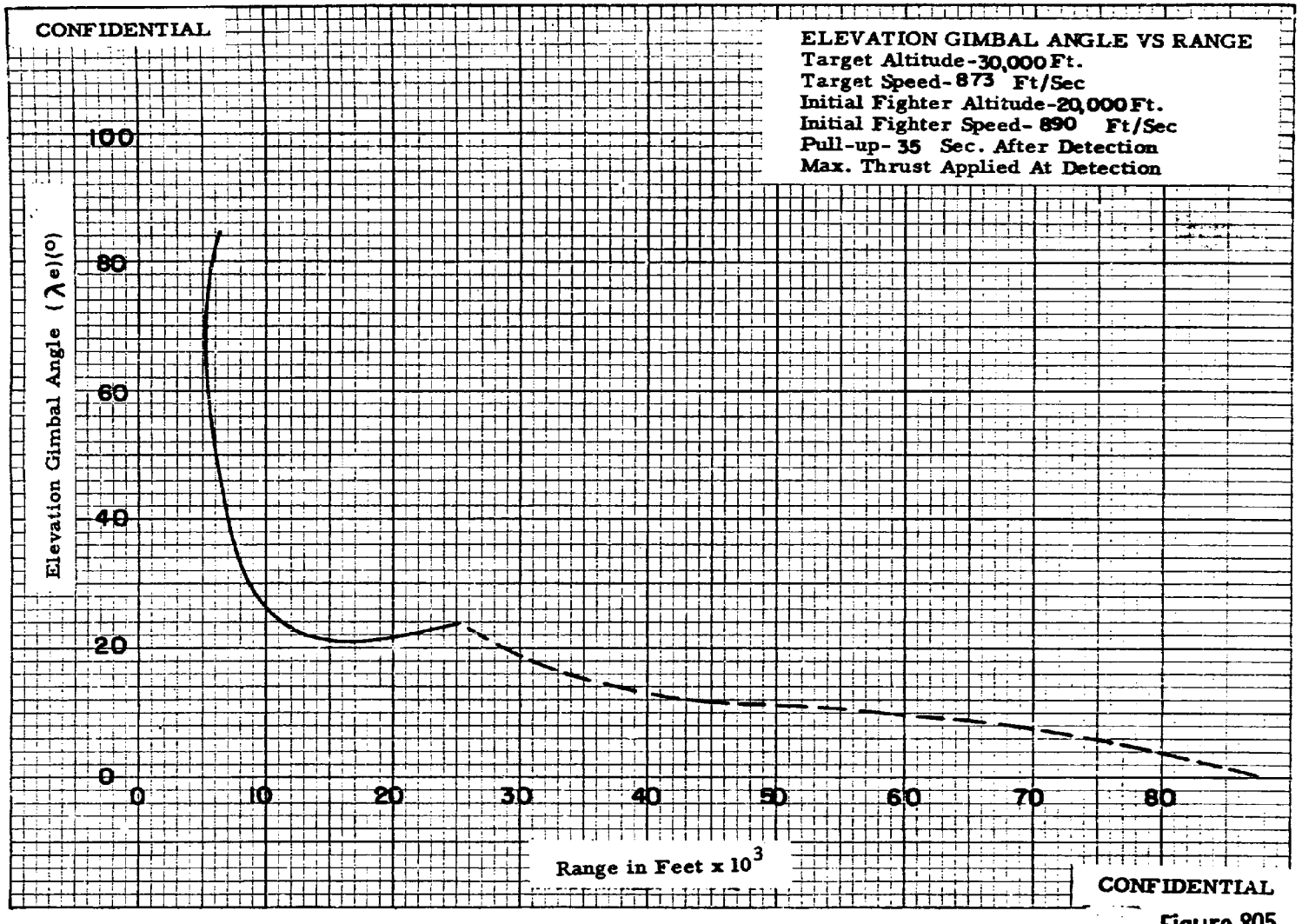
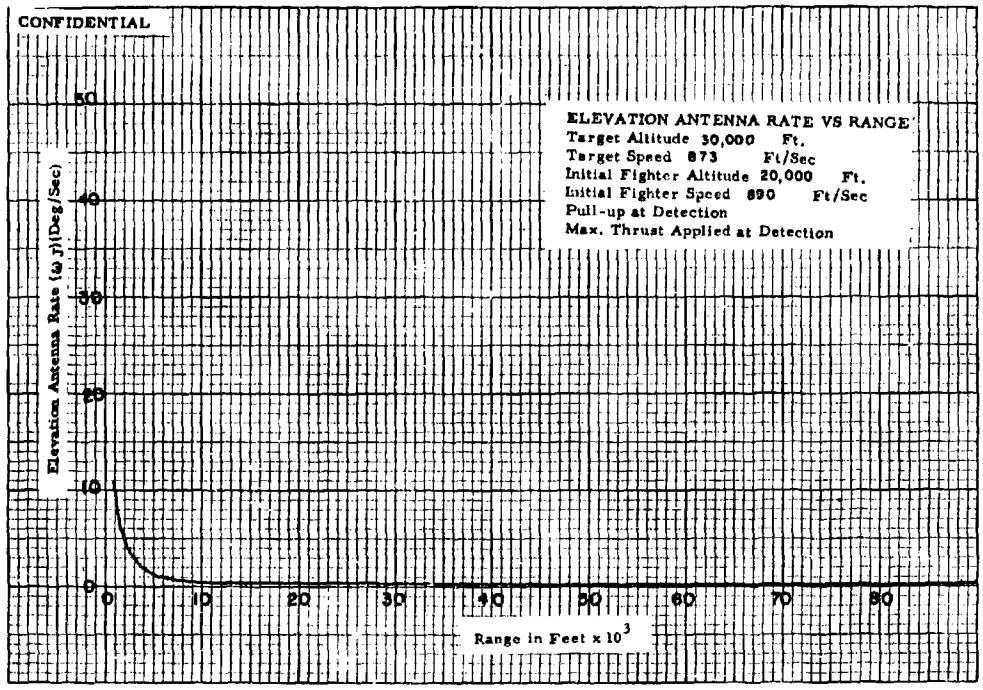
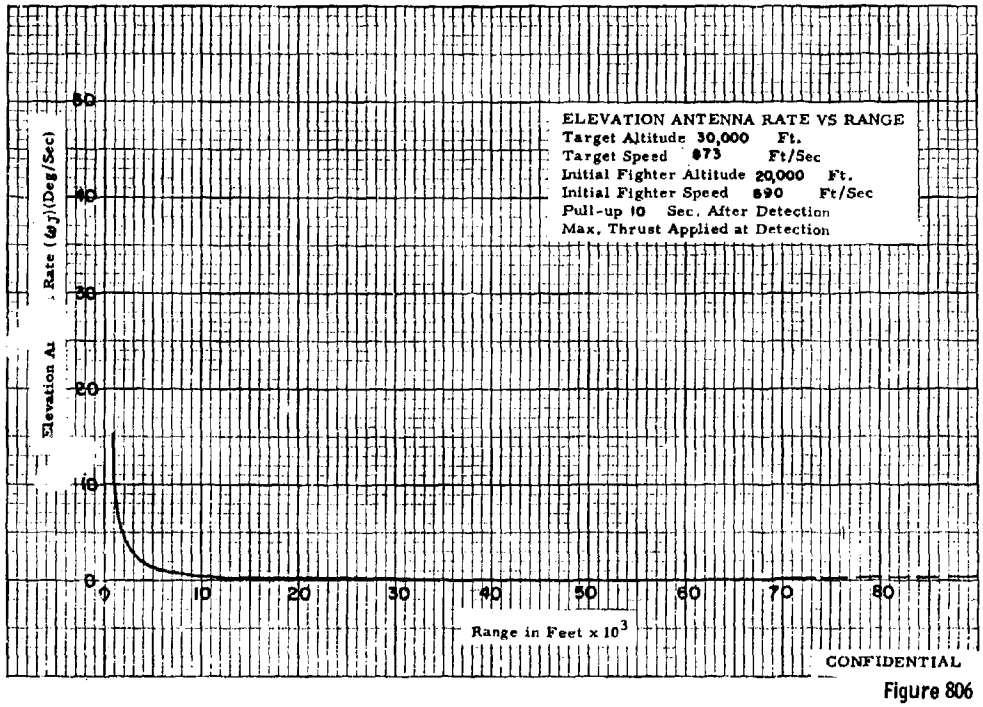

CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed-873 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed-890 Ft/Sec
Pull-up-35 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 805

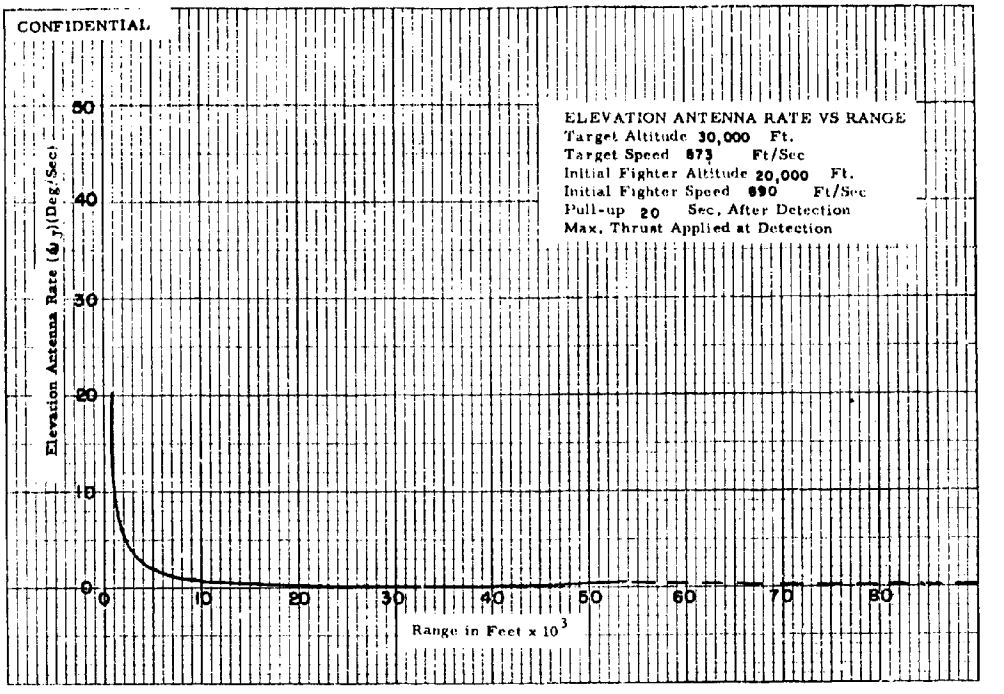
CONFIDENTIAL





CONFIDENTIAL

Figure 806


CONFIDENTIAL
ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (dγ)(Deg/Sec)
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

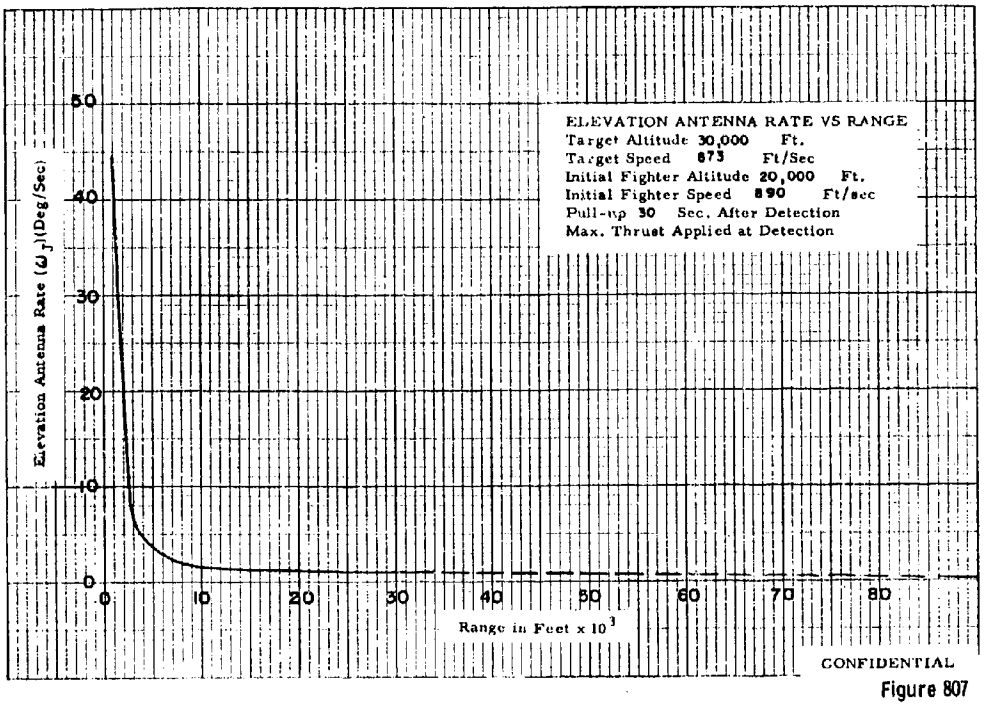

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (dγ)(Deg/Sec)
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3
CONFIDENTIAL

Figure 807

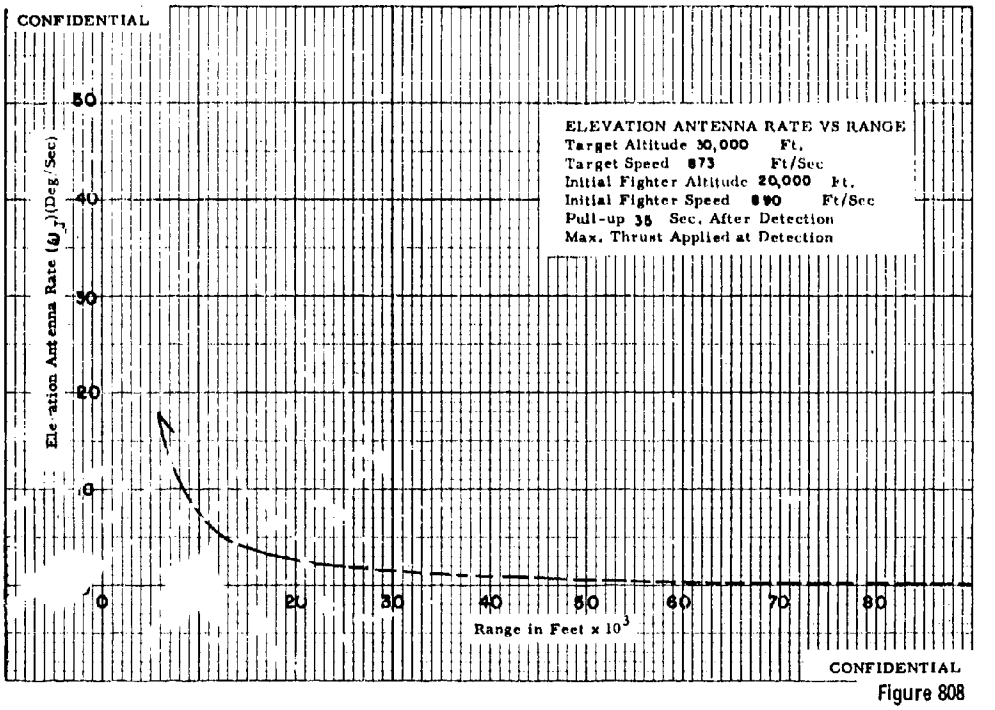


Figure 808

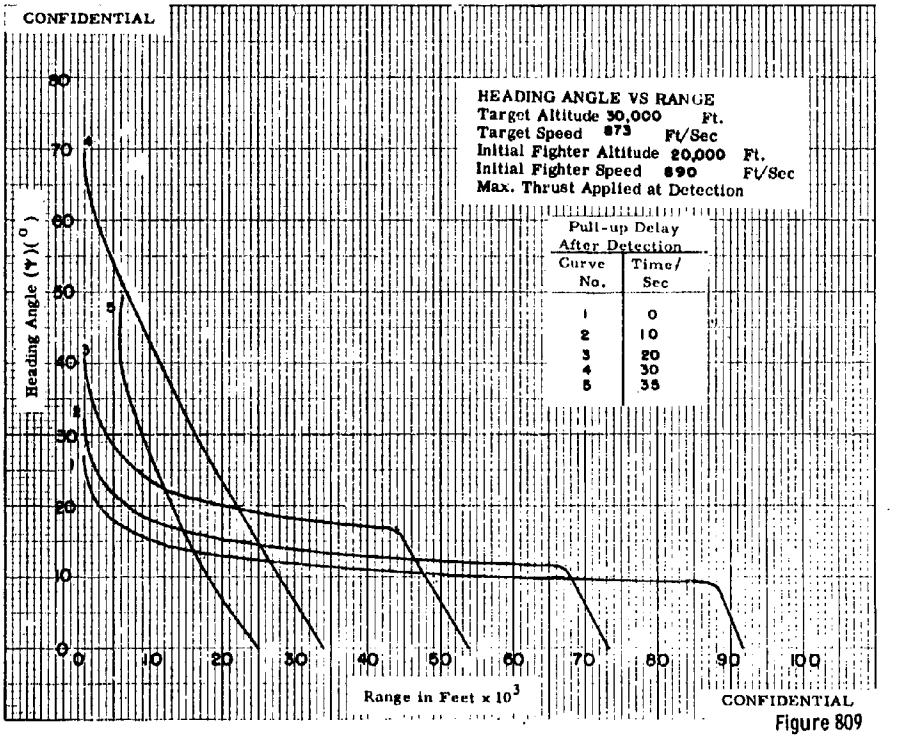
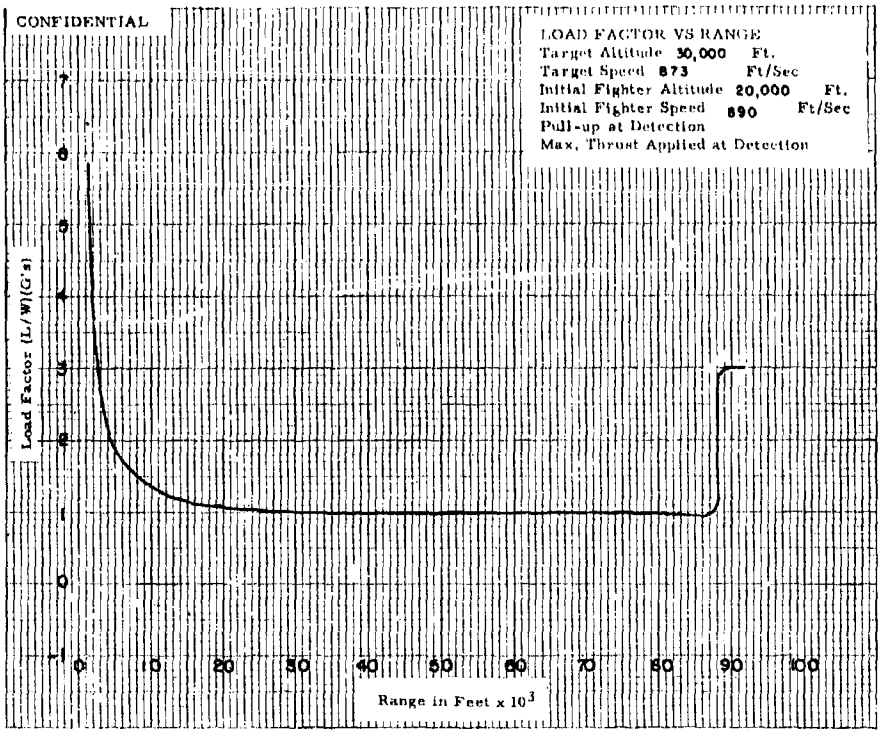


Figure 809


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3

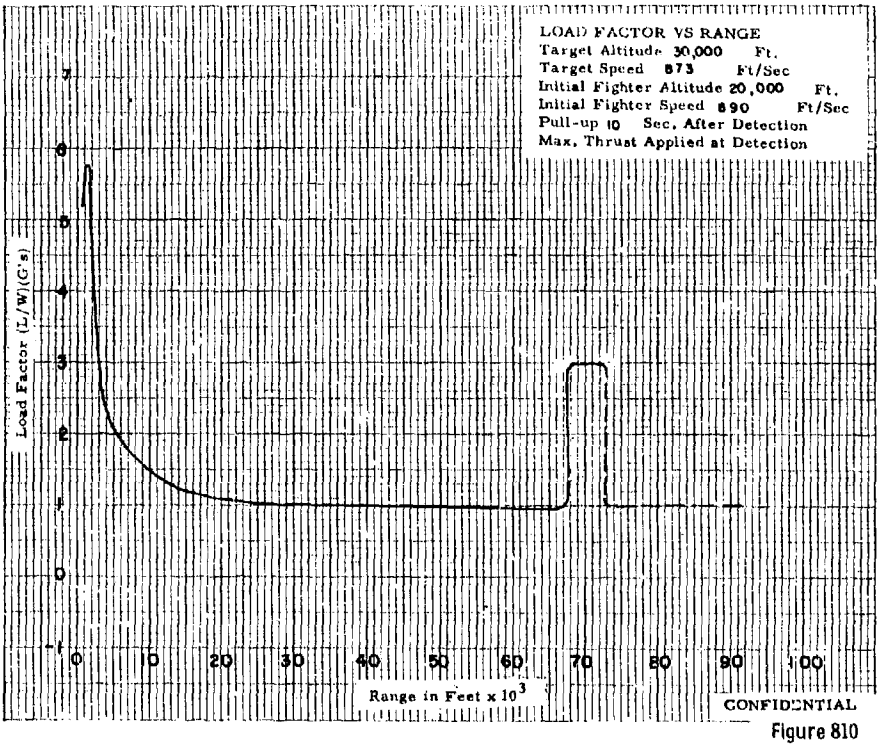
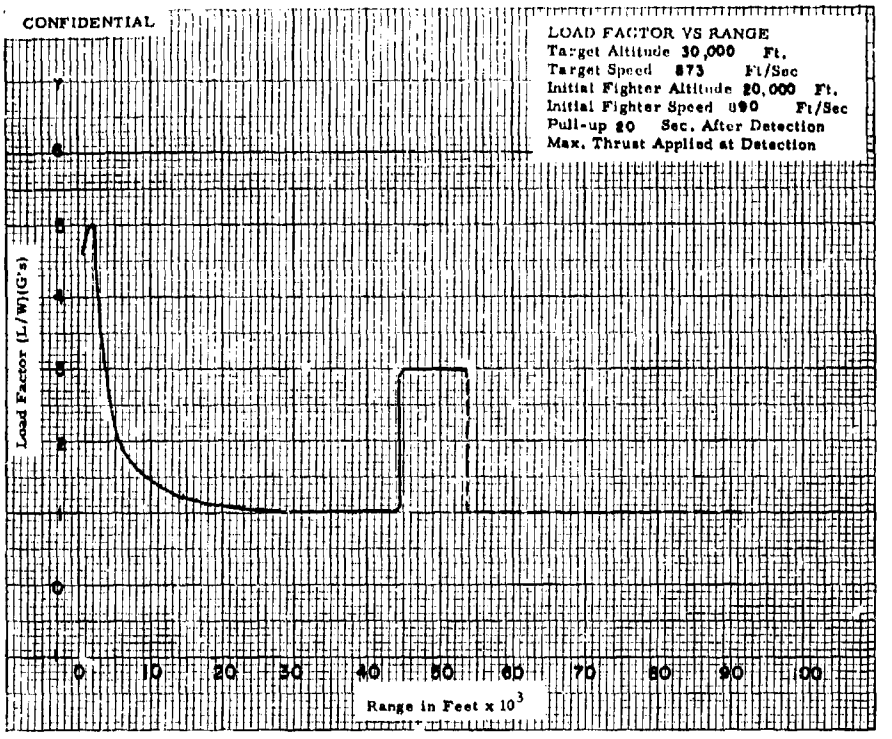
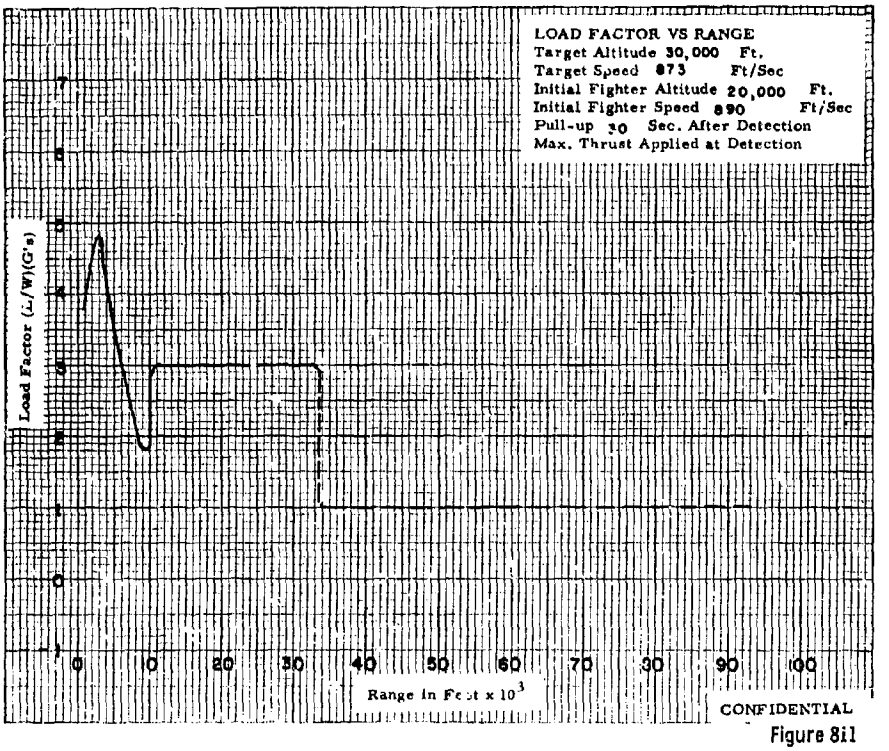

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
CONFIDENTIAL

Figure 810

CONFIDENTIAL





CONFIDENTIAL

Figure 8i1

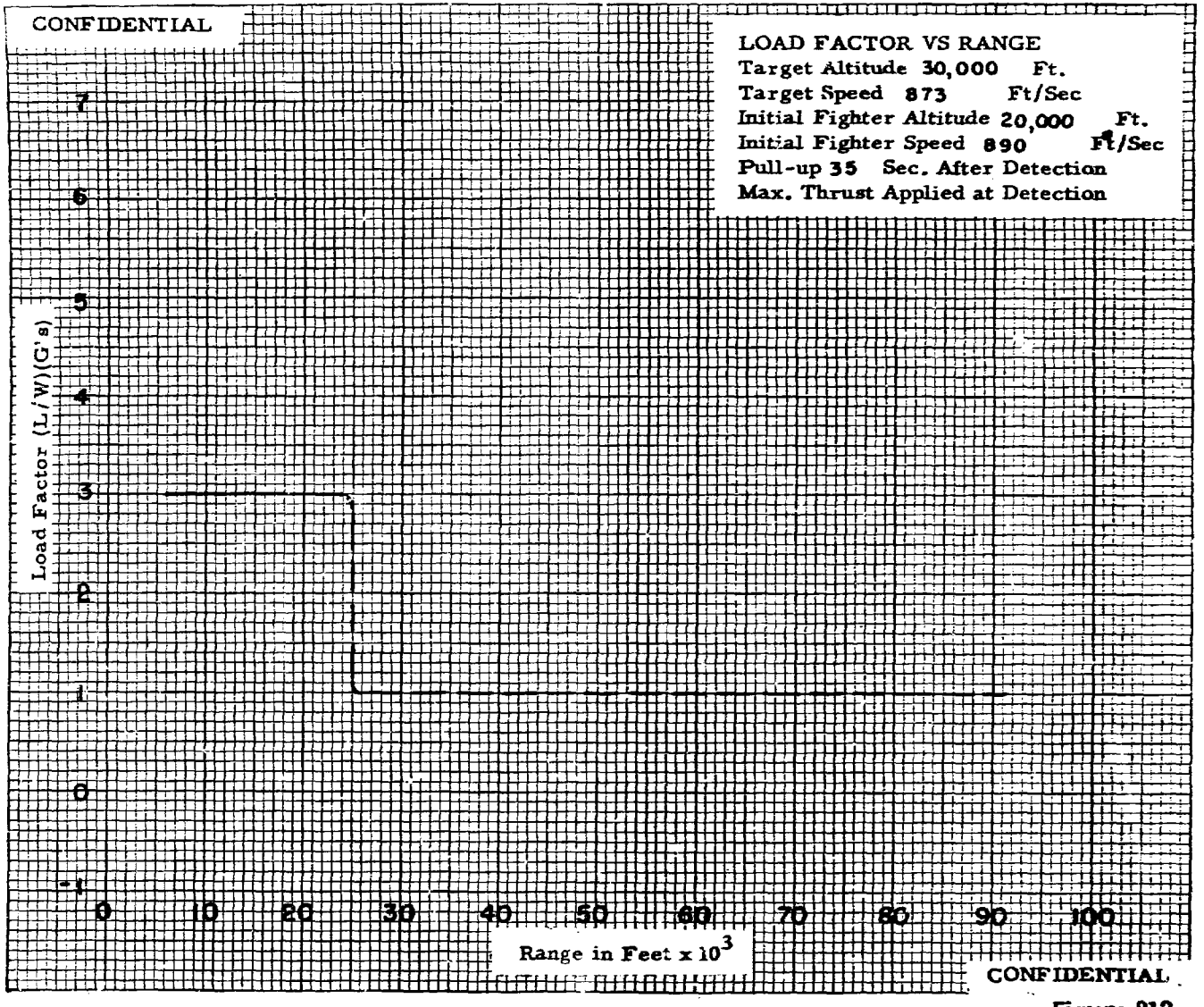
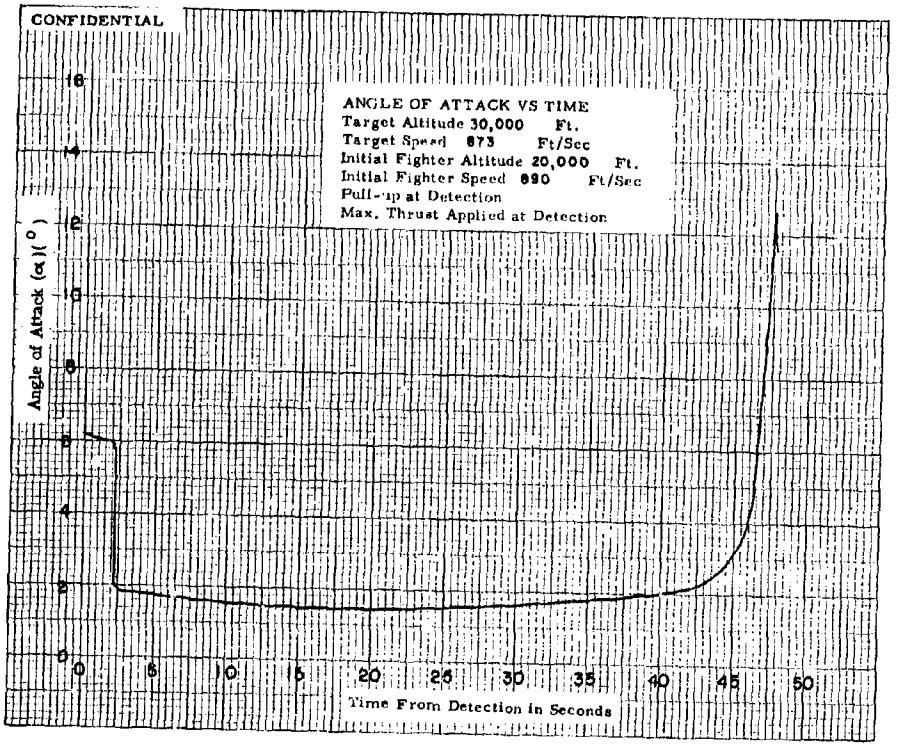

CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
7
6
5
4
3
2
1
0
-1
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 812


ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Angle of Attack (α)(°)
Time From Detection in Seconds

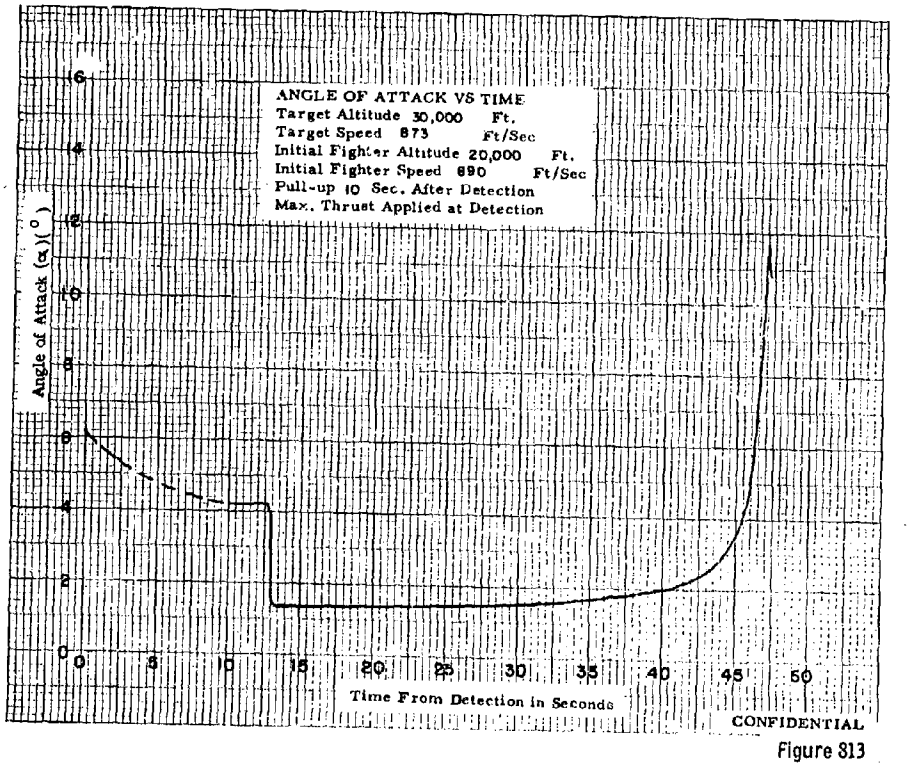
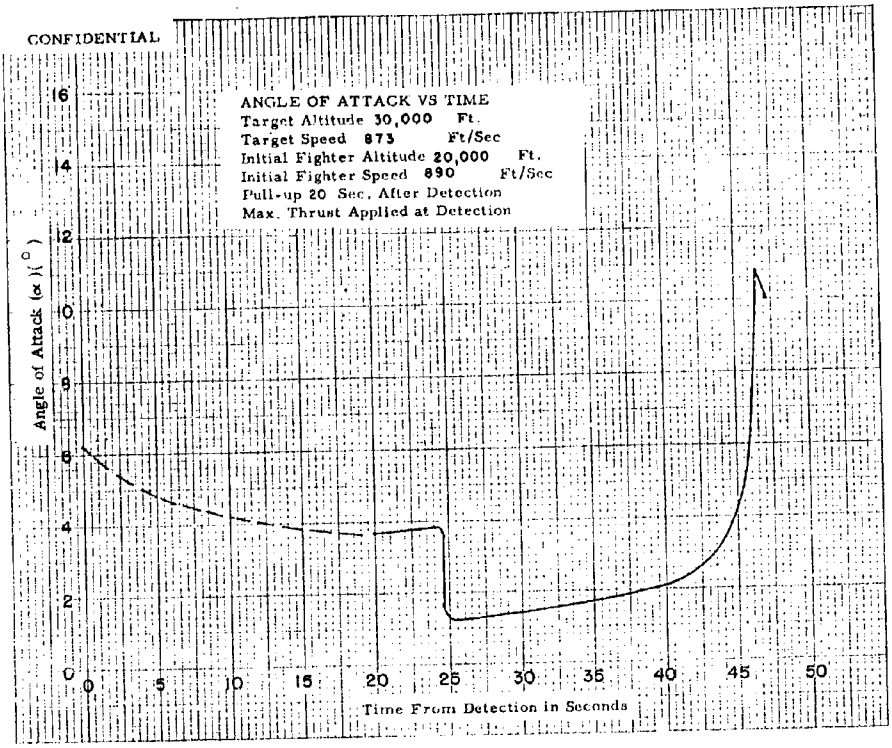
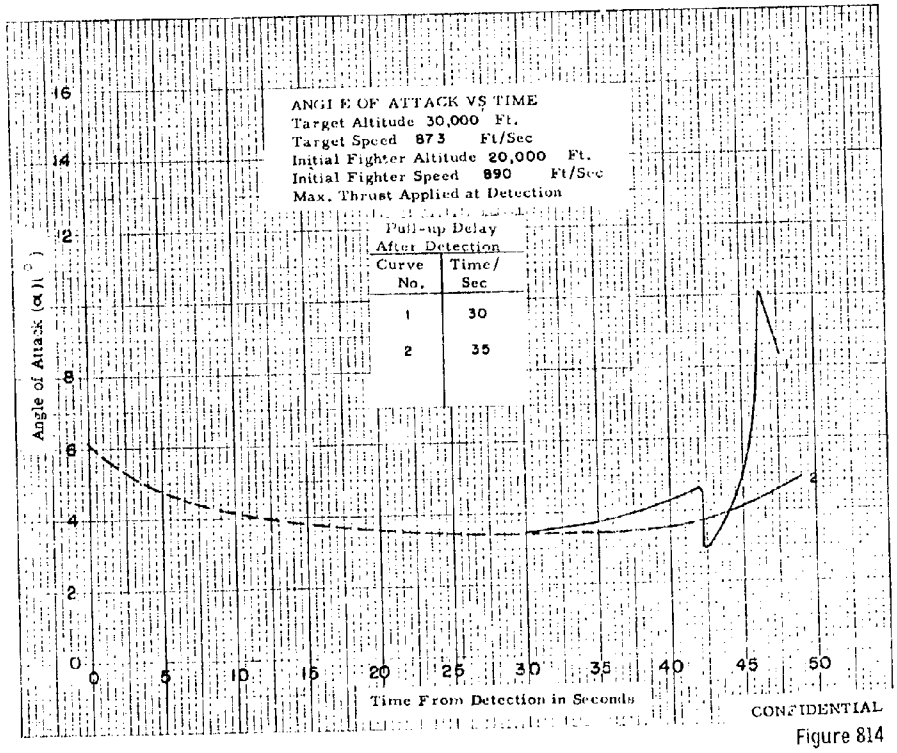

ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Angle of Attack (α)(°)
Time From Detection in Seconds

Figure 813

CONFIDENTIAL





CONFIDENTIAL

Figure 814

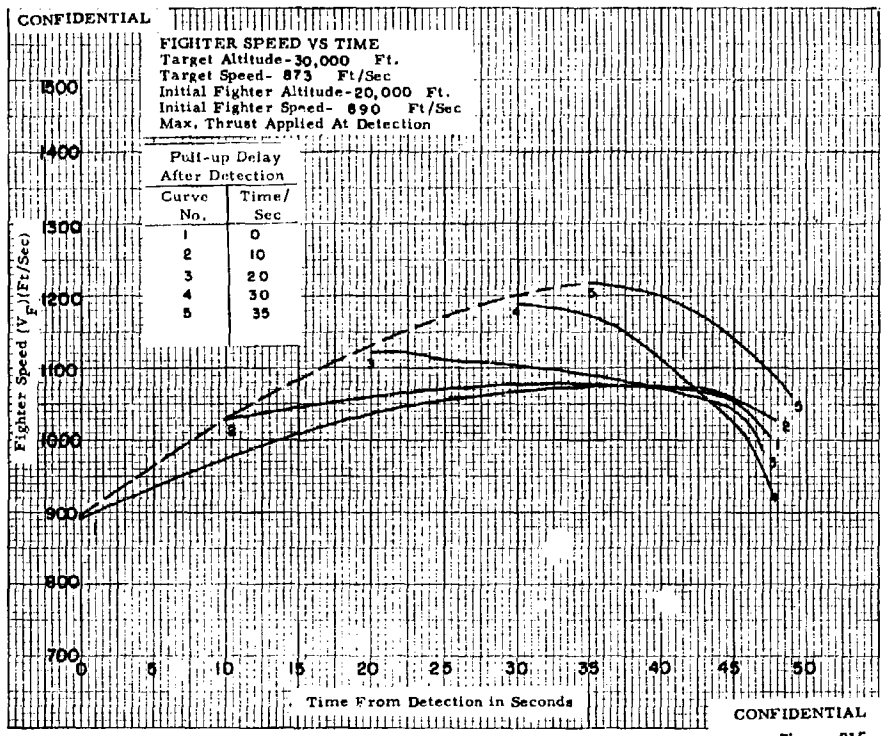


Figure 815

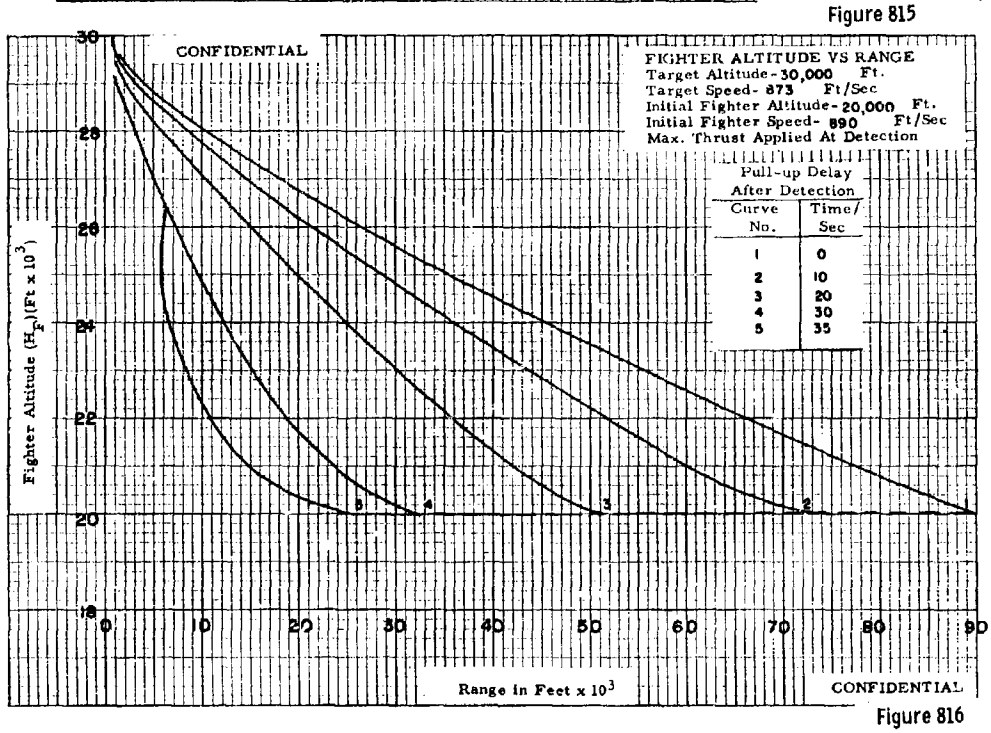
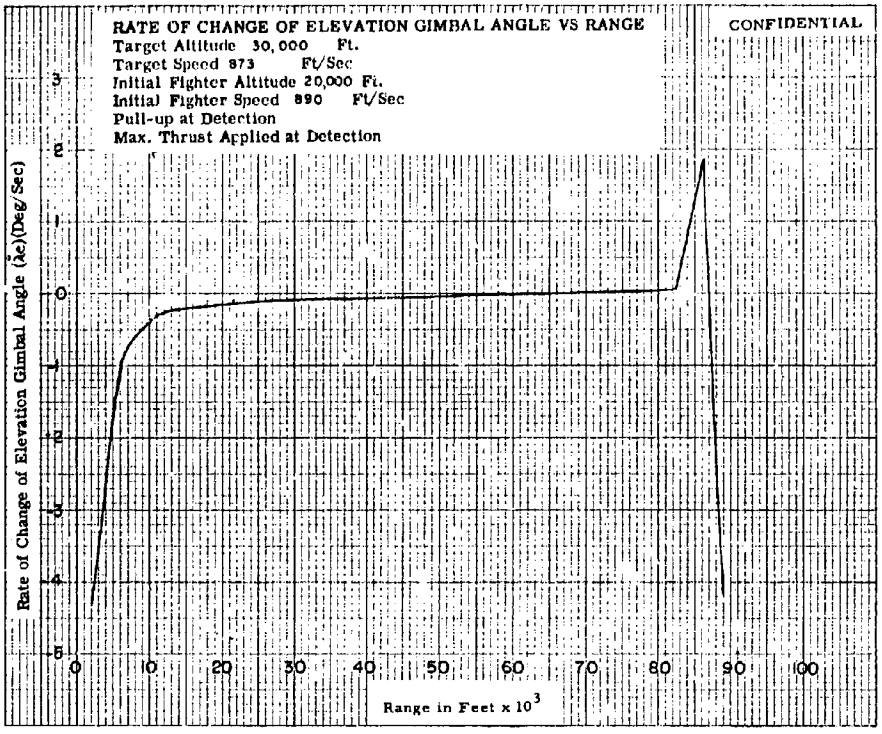


Figure 816


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
CONFIDENTIAL
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
3
2
1
0
-1
-2
-3
-4
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

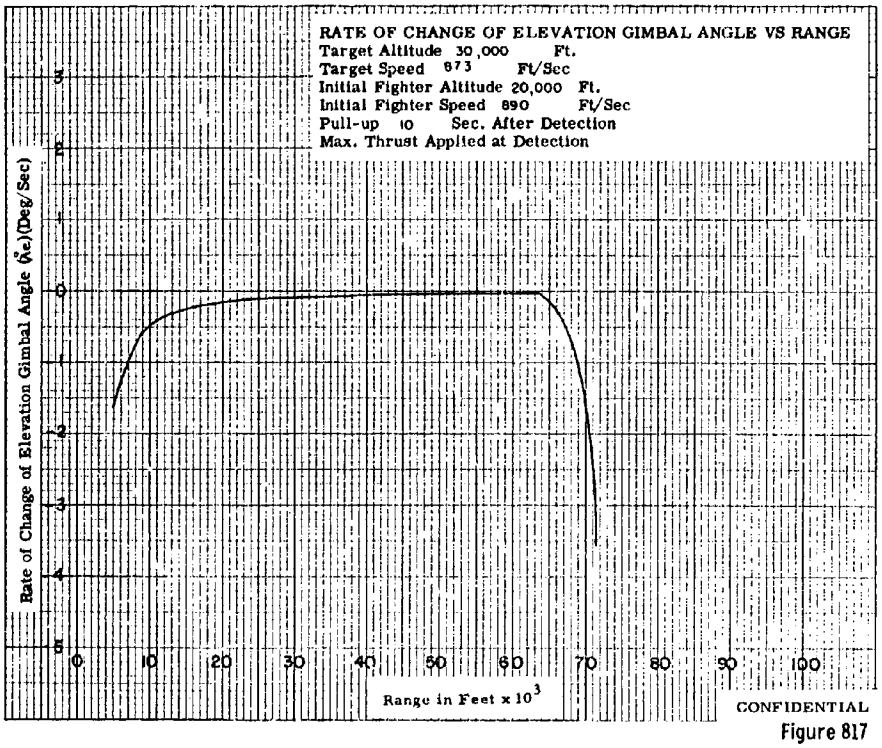
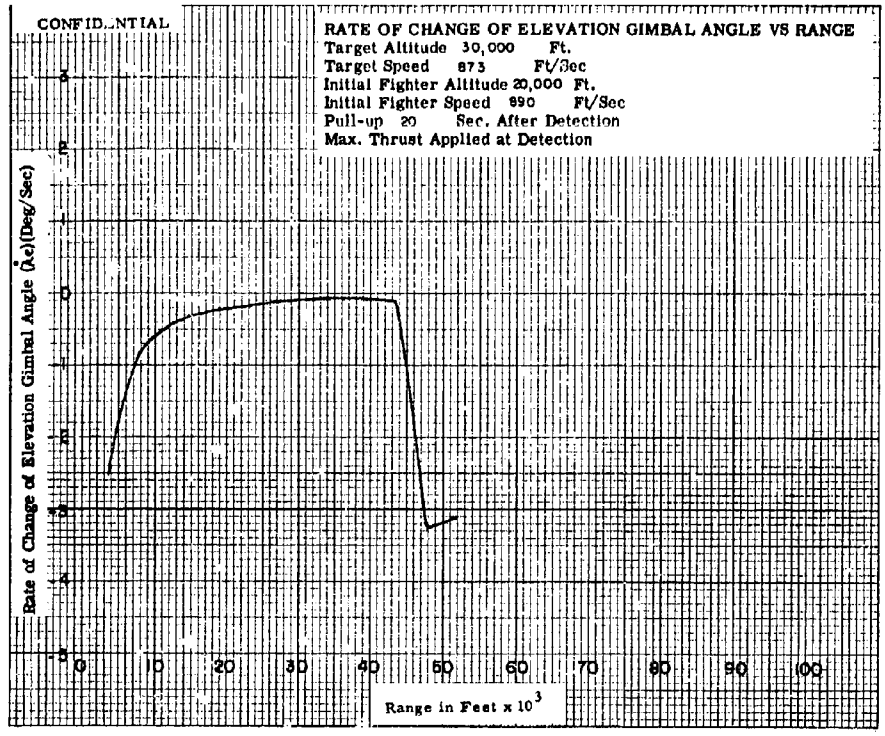

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
3
2
1
0
-1
-2
-3
-4
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 817


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
Range in Feet x 10^3

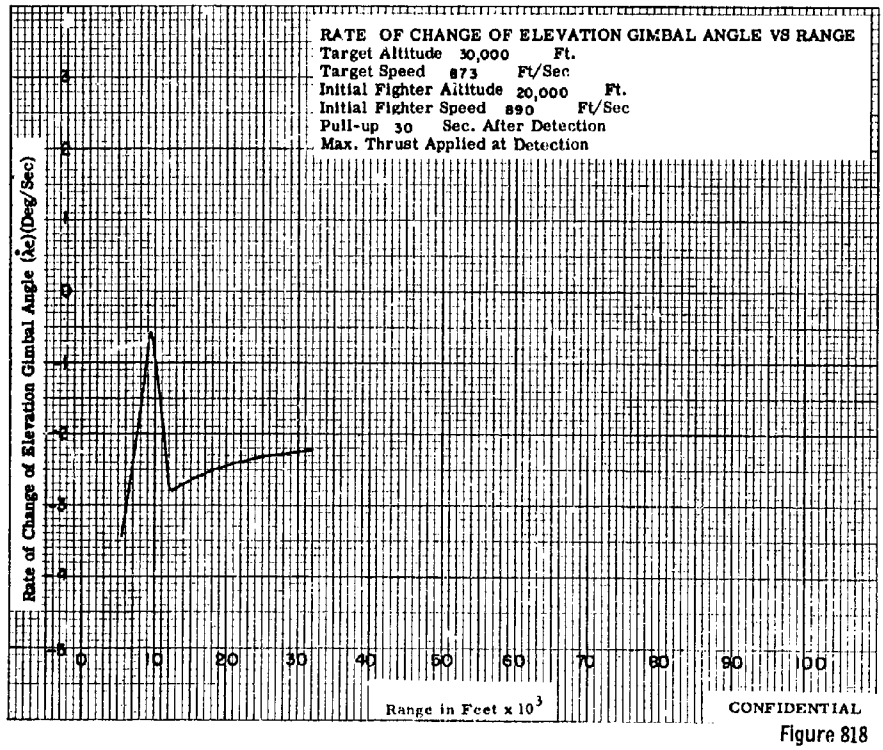

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λe)(Deg/Sec)
Range in Feet x 10^3

Figure 818

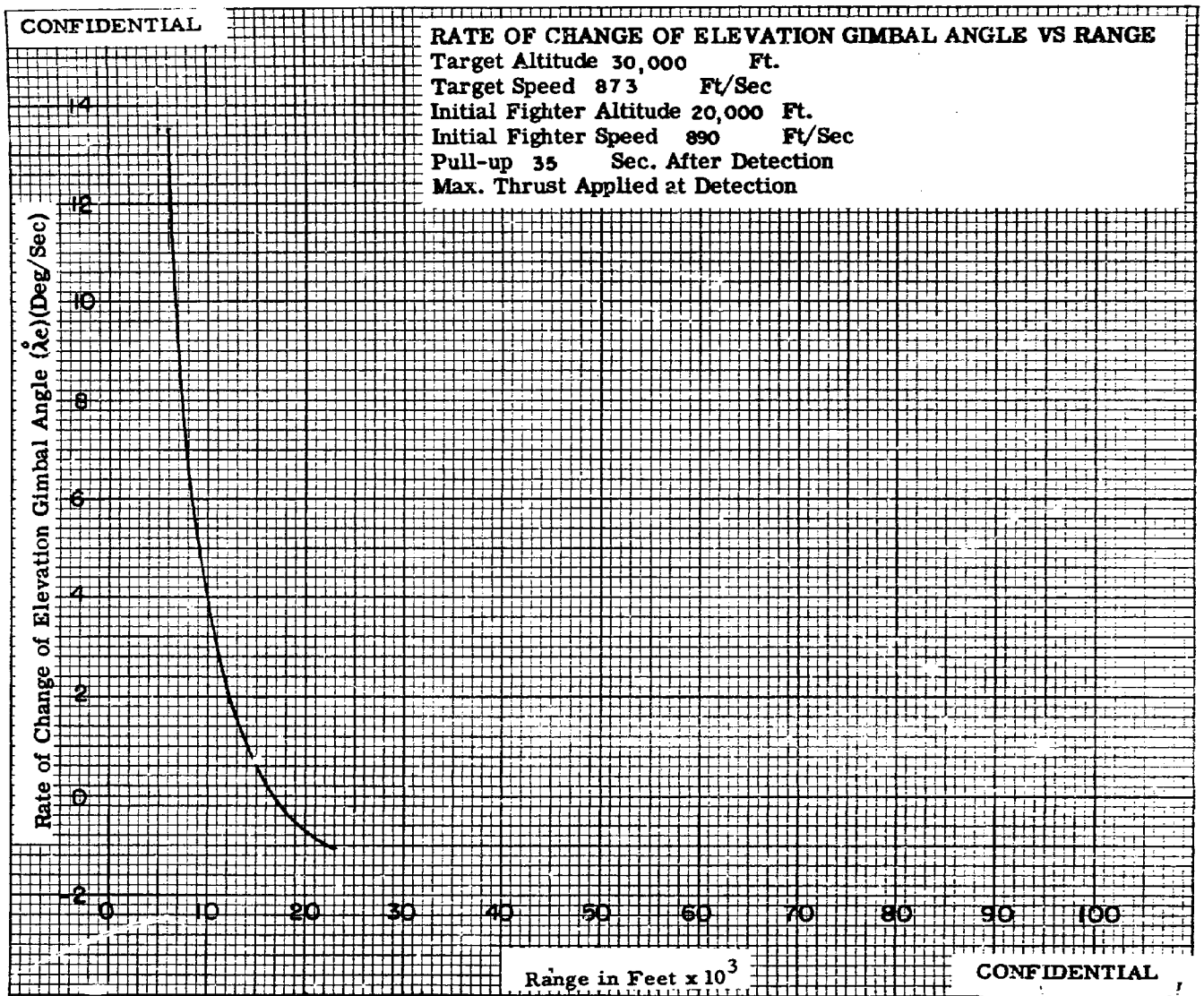
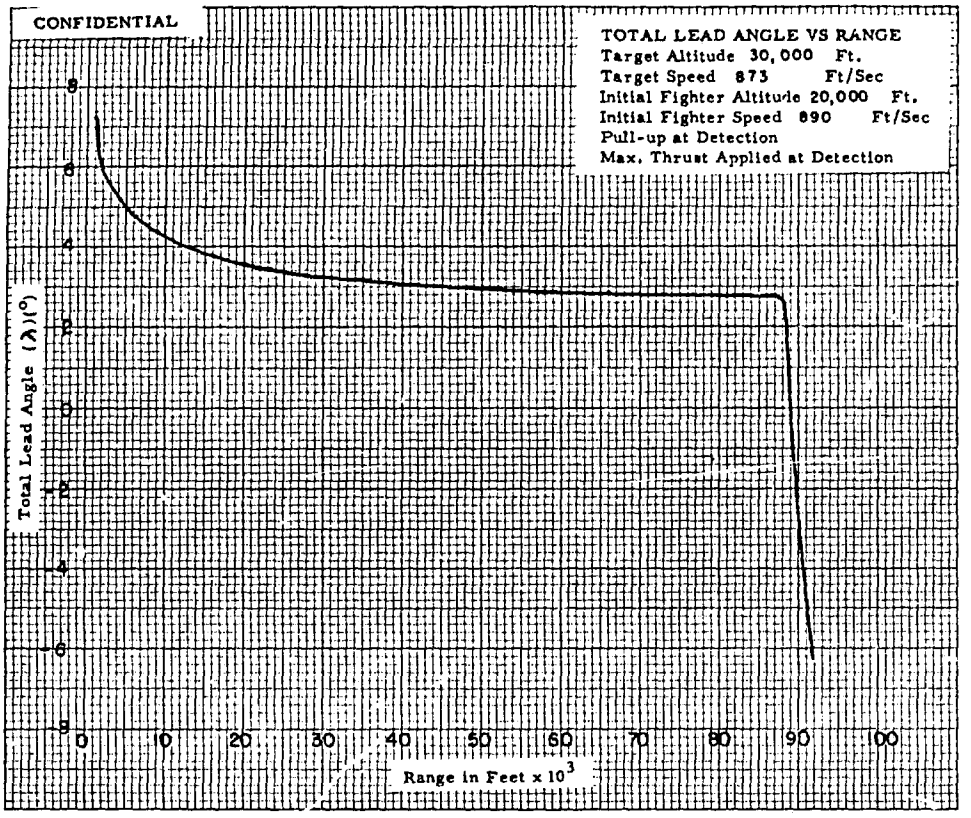

CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇e)(Deg/Sec)
14
12
10
8
6
4
2
0
-2
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 819


TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
8
6
4
2
0
-2
-4
-6
-8
0
10
20
30
40
50
60
70
80
90
00
Range in Feet x 10^3

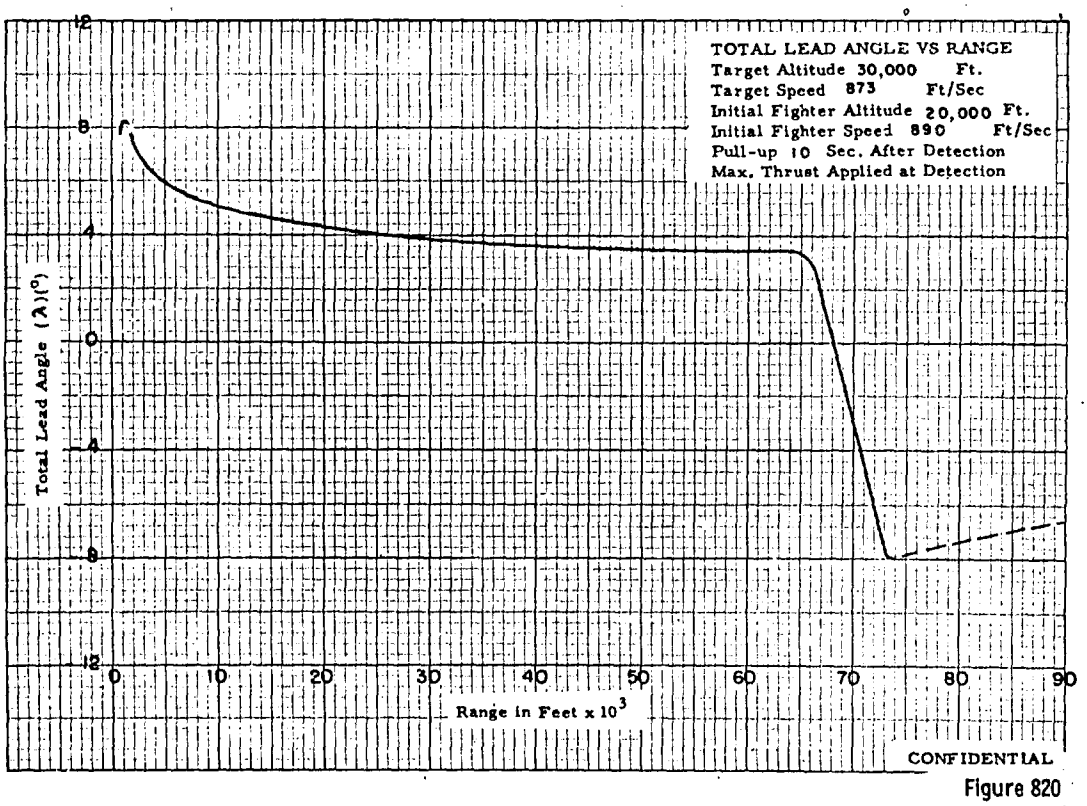
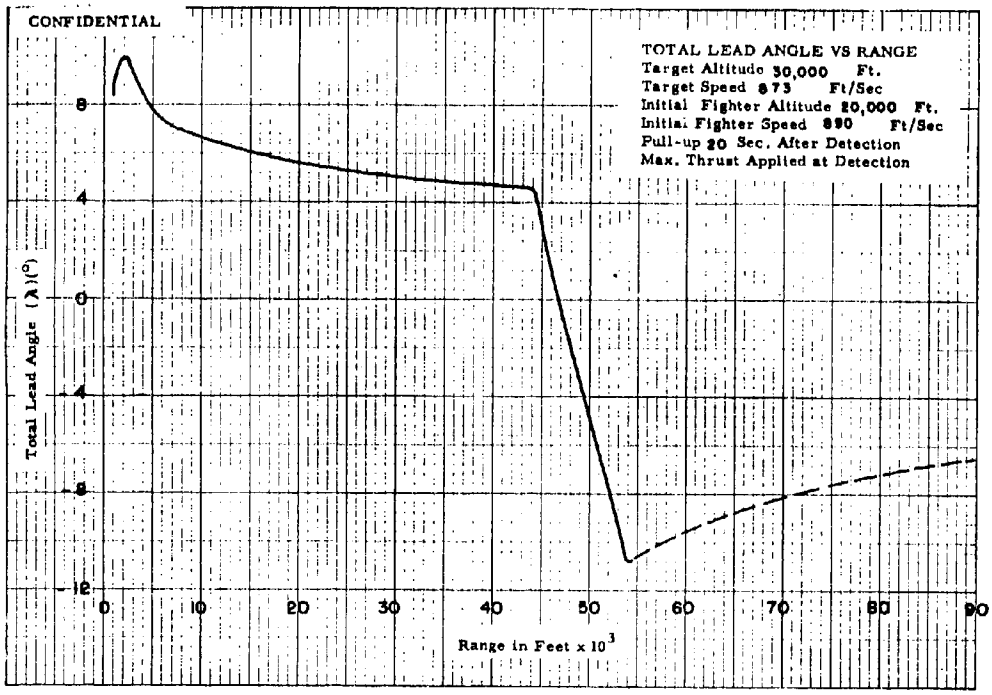

TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
12
8
4
0
-4
-8
-12
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3

Figure 820


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
8
4
0
-4
-8
-12
0
10
20
30
40
50
60
70
80
90
Range in Feet x 10^3

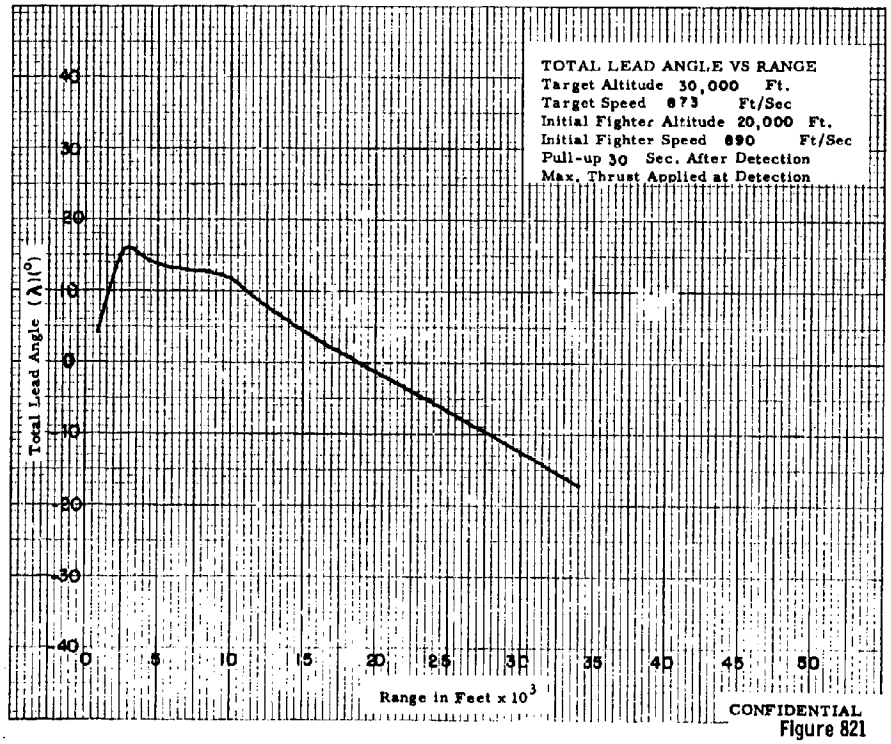
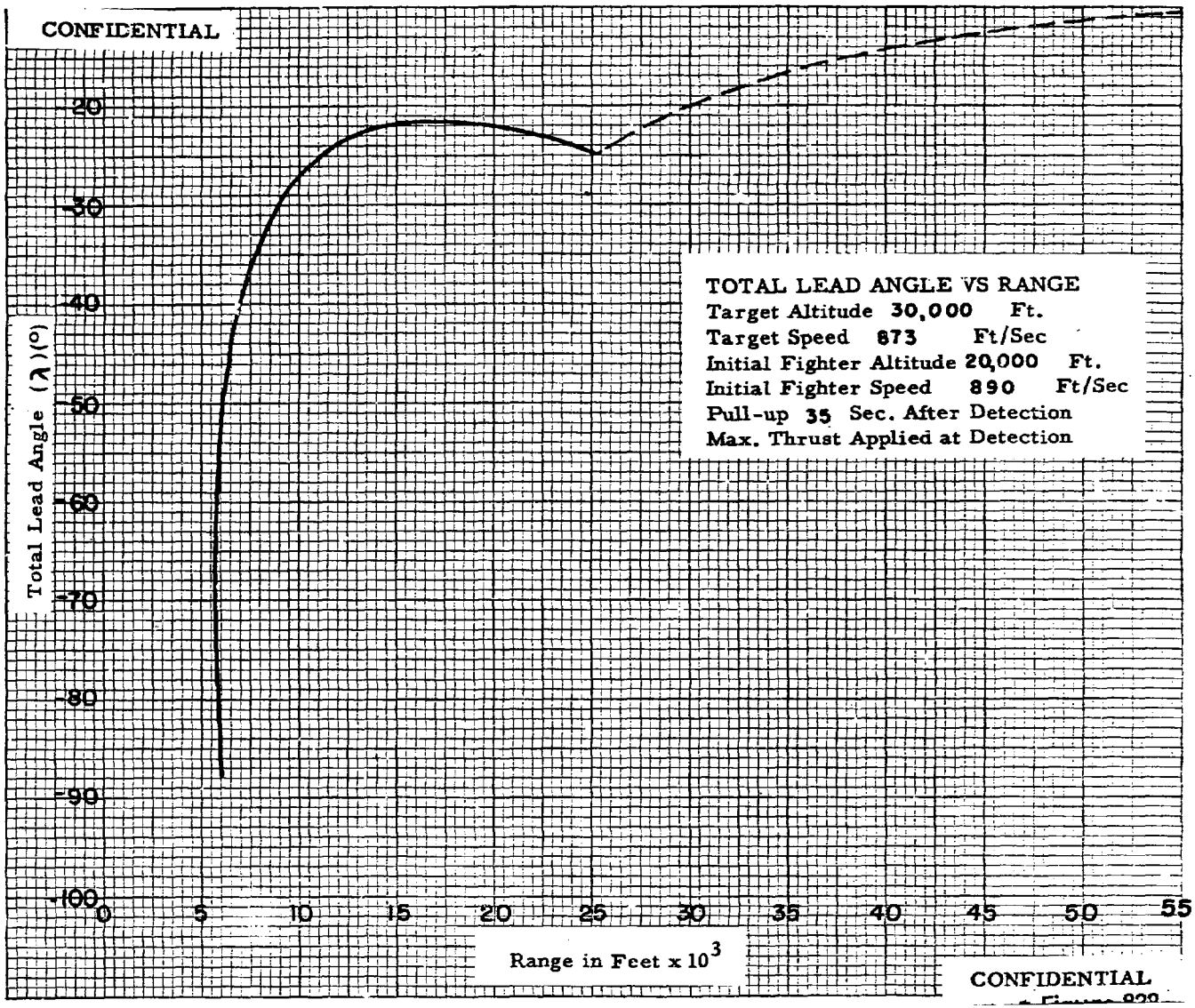
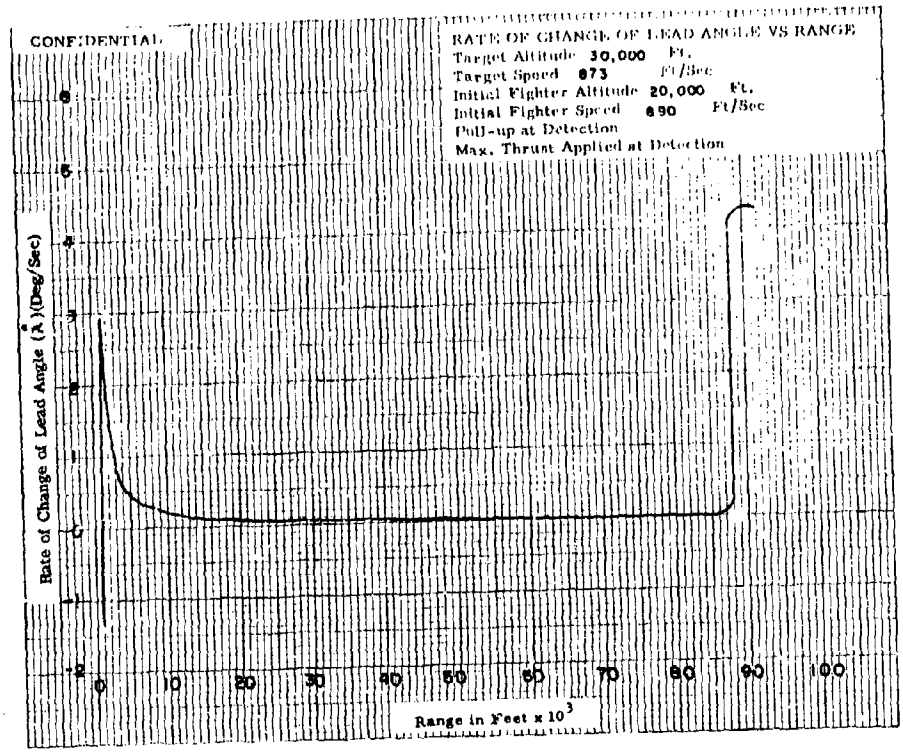

TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
40
30
20
10
0
-10
-20
-30
-40
0
5
10
15
20
25
30
35
40
45
50
Range in Feet x 10^3
CONFIDENTIAL

Figure 821


CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
5
10
15
20
25
30
35
40
45
50
55
Range in Feet x 10^3
CONFIDENTIAL


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90
100

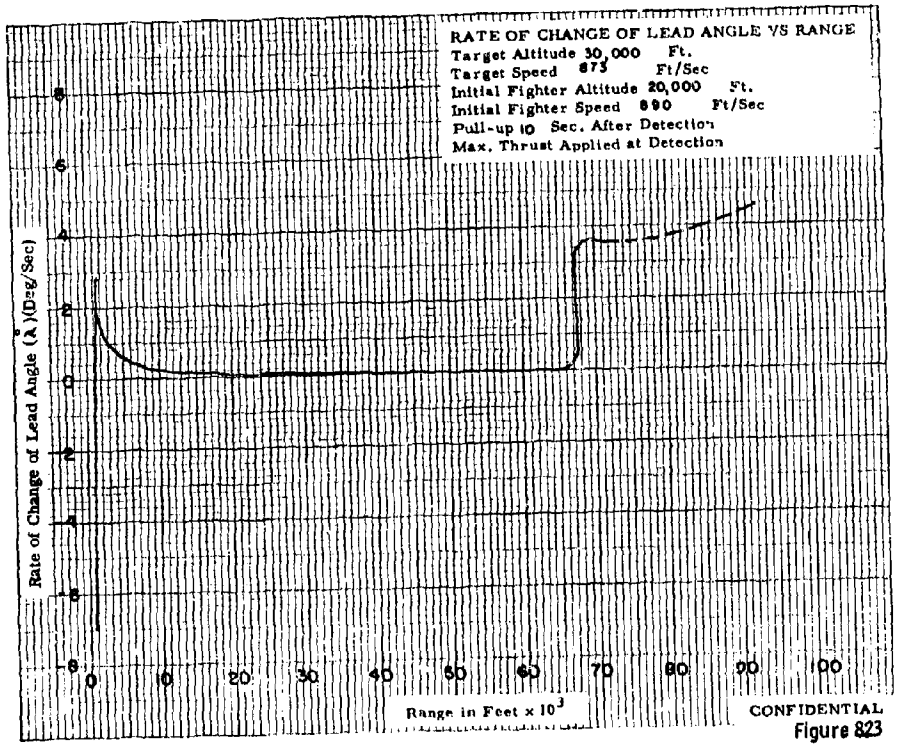
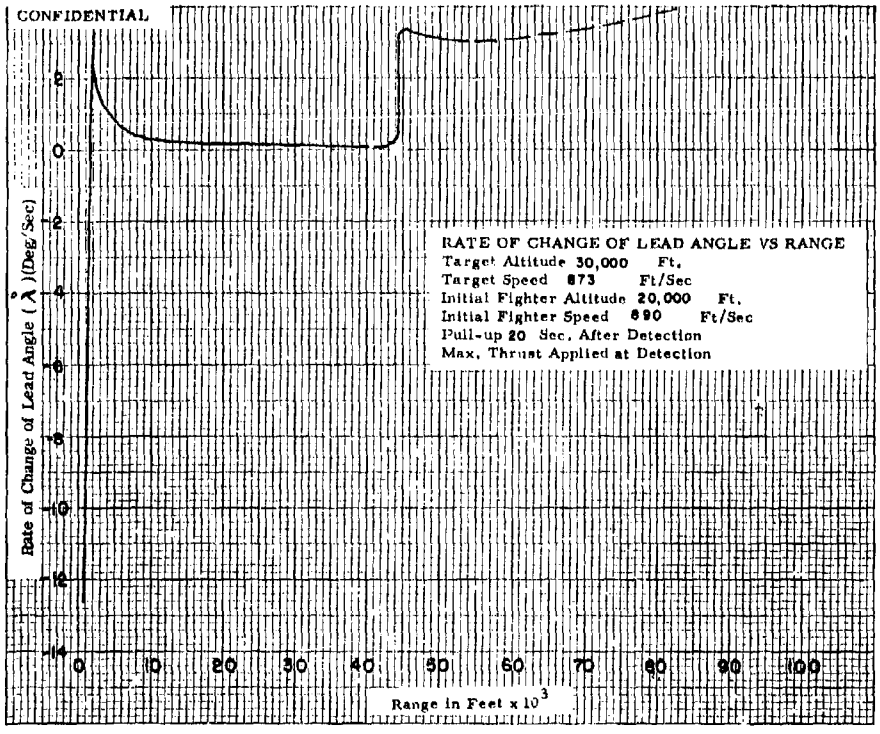

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90
100

Figure 823


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
2
0
-2
-4
-6
-8
-10
-12
-14
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

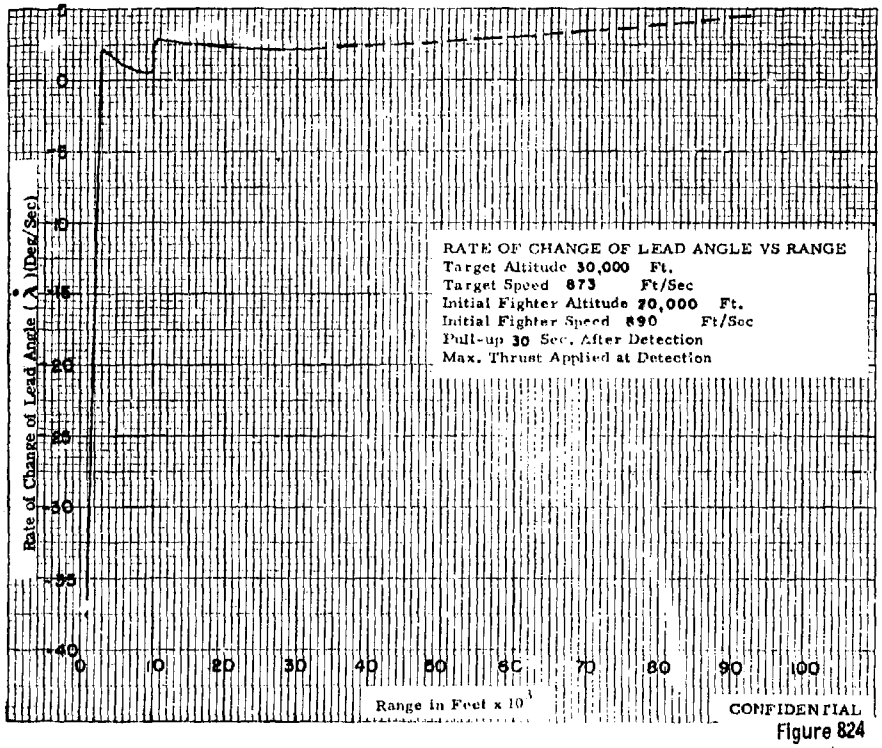

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
0
-5
-10
-15
-20
-25
-30
-35
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 824

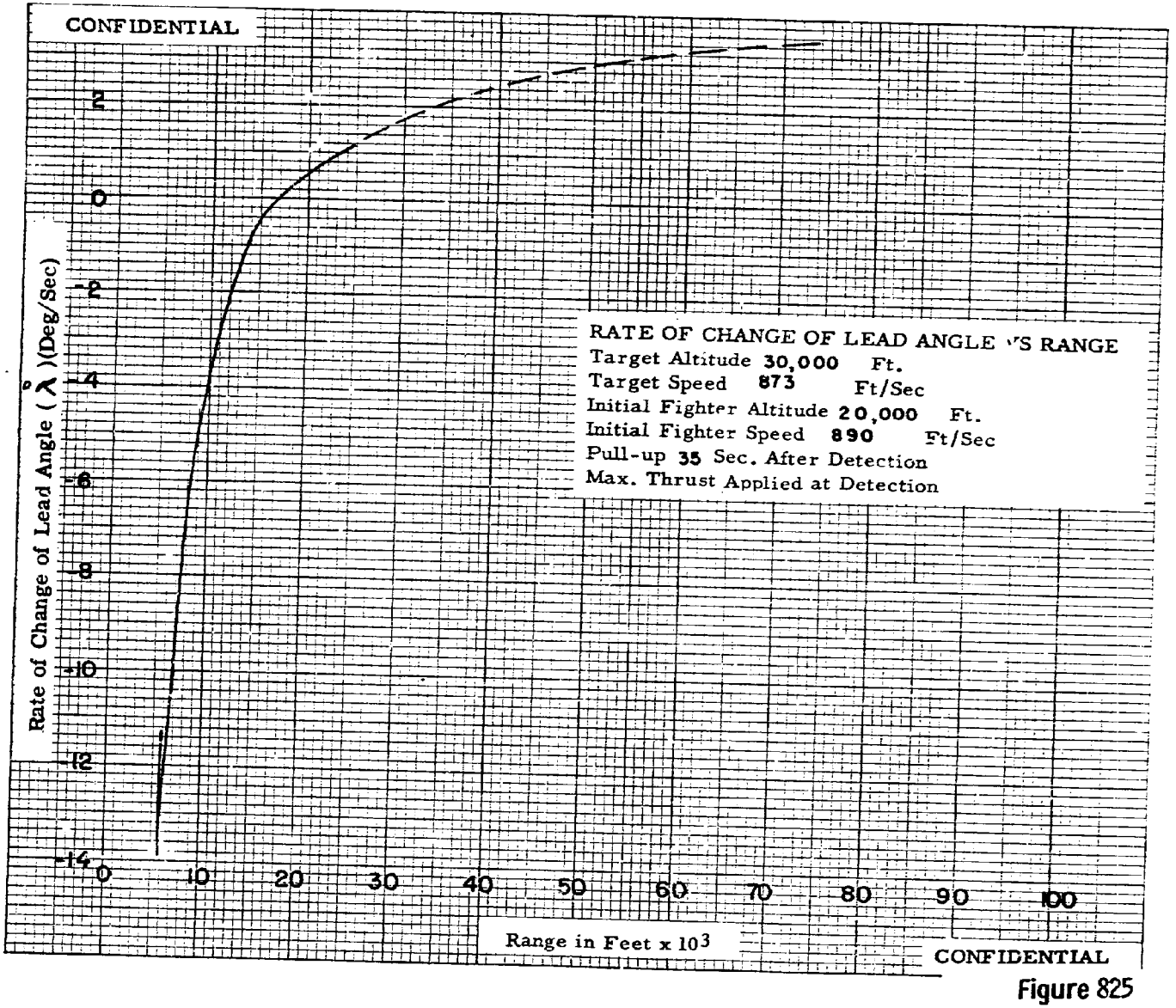
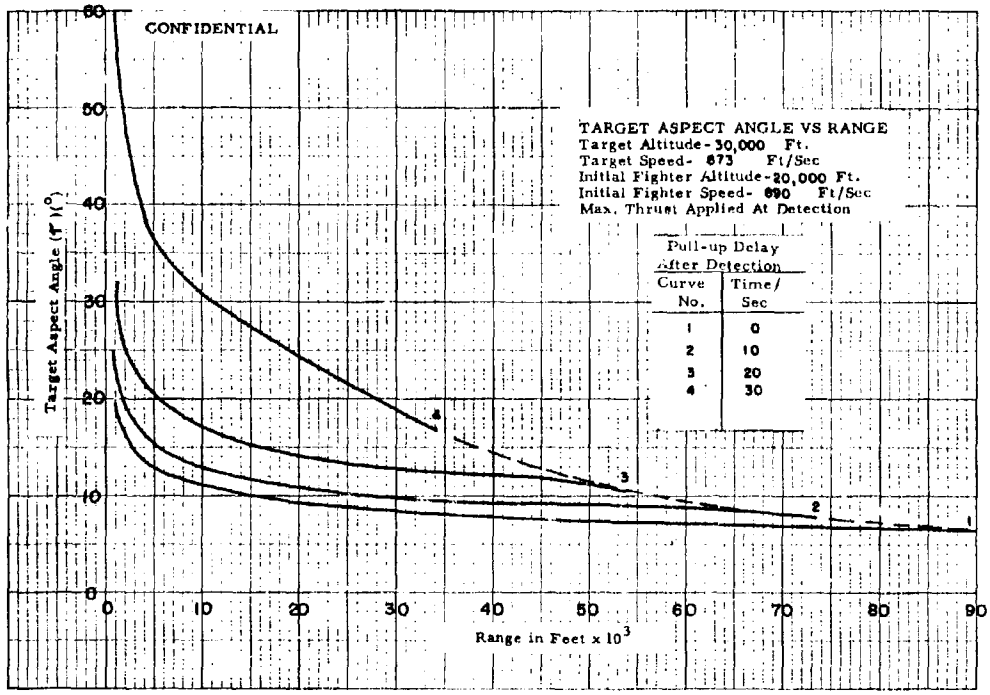

CONFIDENTIAL
RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 35 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇) (Deg/Sec)
2
0
-2
-4
-6
-8
-10
-12
-14
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 825


CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude- 30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 690 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 20
4 | 30
Target Aspect Angle (T)(°)
Range in Feet x 10³
0 10 20 30 40 50 60 70 80 90
0 10 20 30 40 50 60

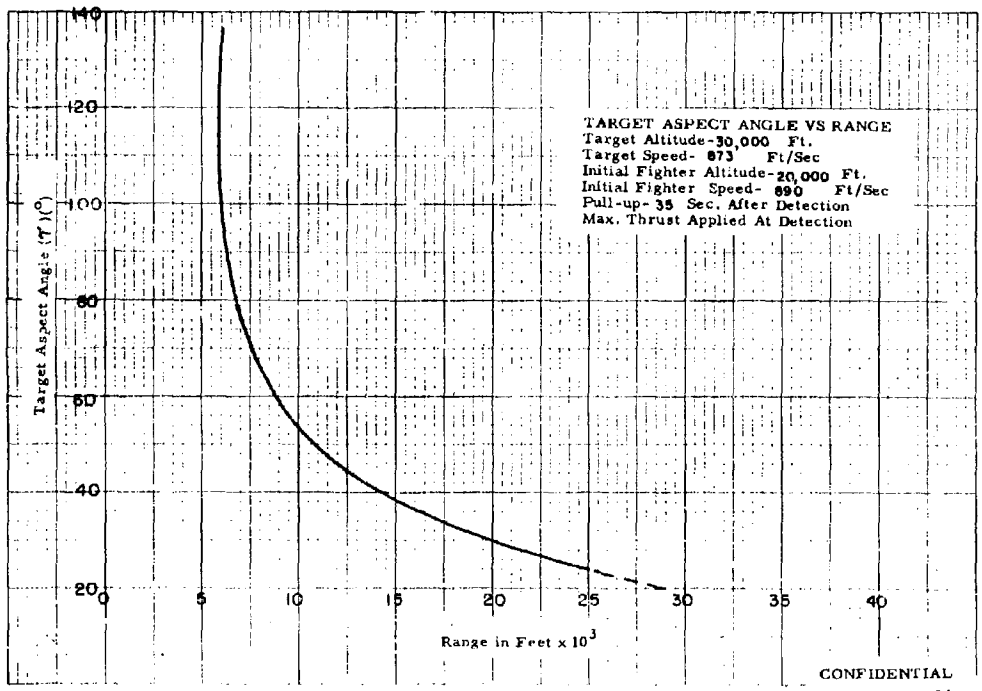
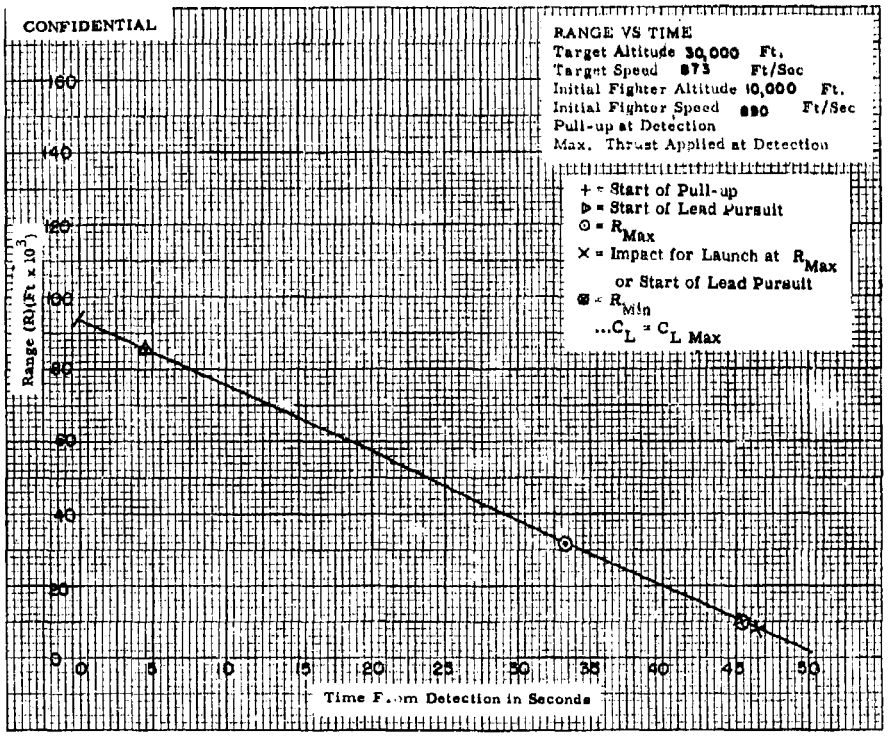

TARGET ASPECT ANGLE VS RANGE
Target Altitude- 30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 690 Ft/Sec
Pull-up- 35 Sec. After Detection
Max. Thrust Applied At Detection
Target Aspect Angle (T)(°)
Range in Feet x 10³
0 5 10 15 20 25 30 35 40
20 40 60 80 100 120 140
CONFIDENTIAL

Figure 826


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

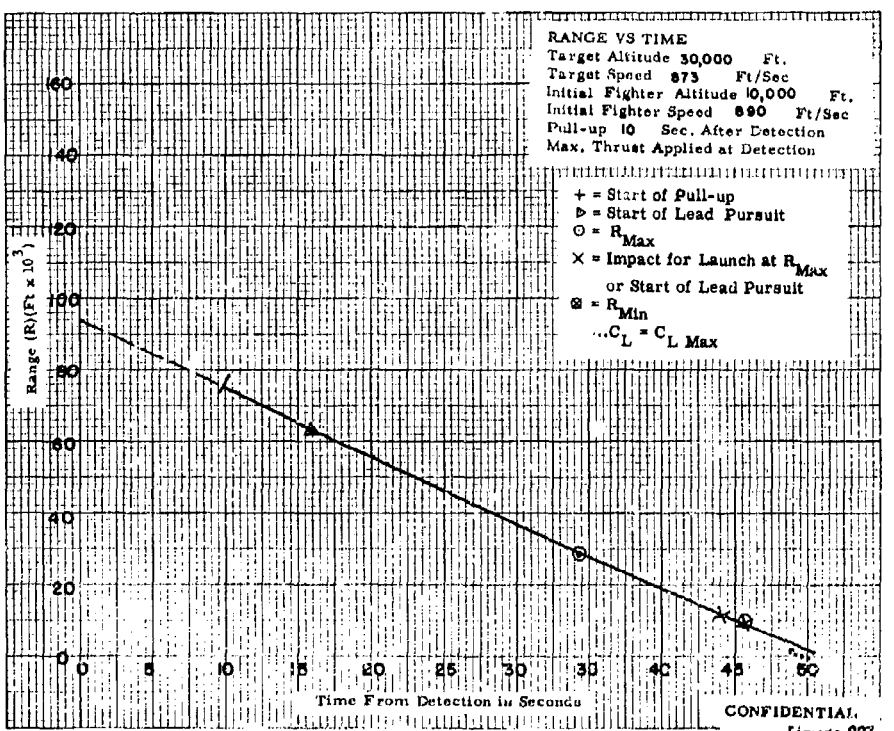
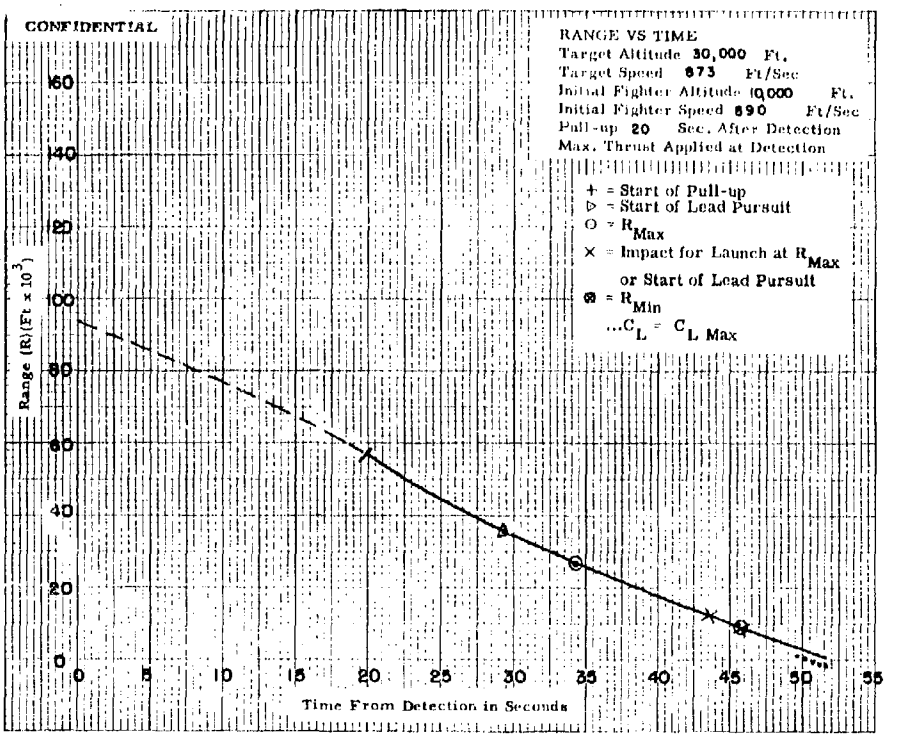

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 827


RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min ...C L = C L Max
Range (R) (Ft x 10^3)
Time From Detection in Seconds

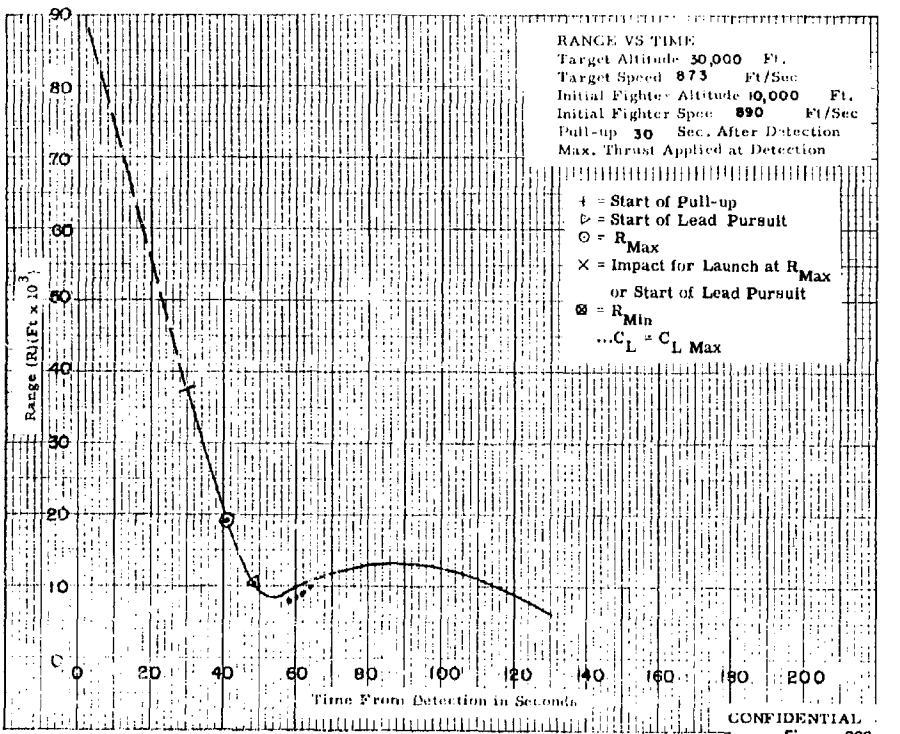
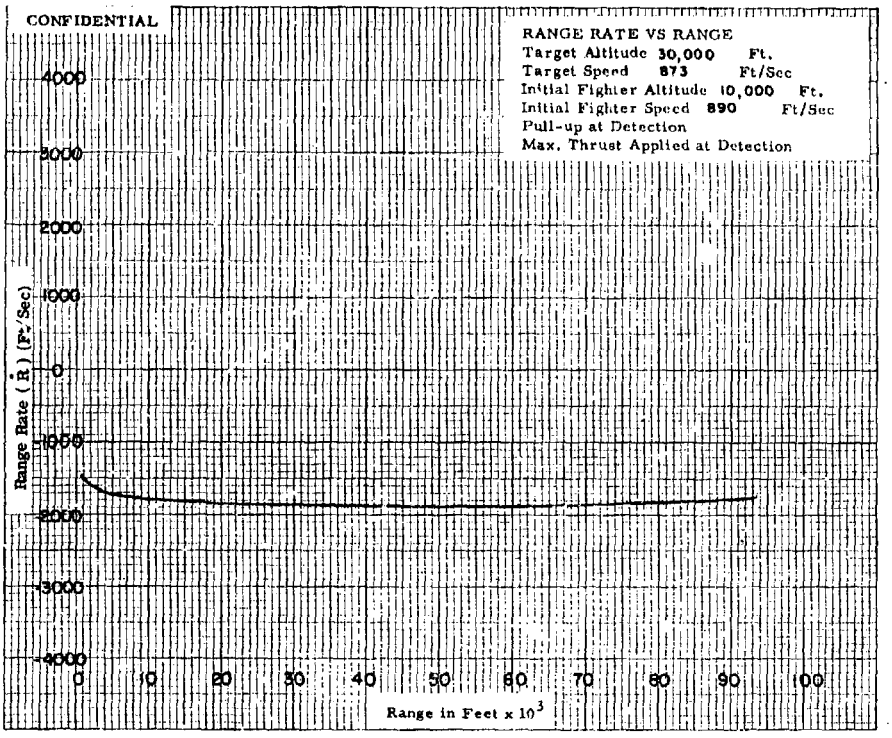
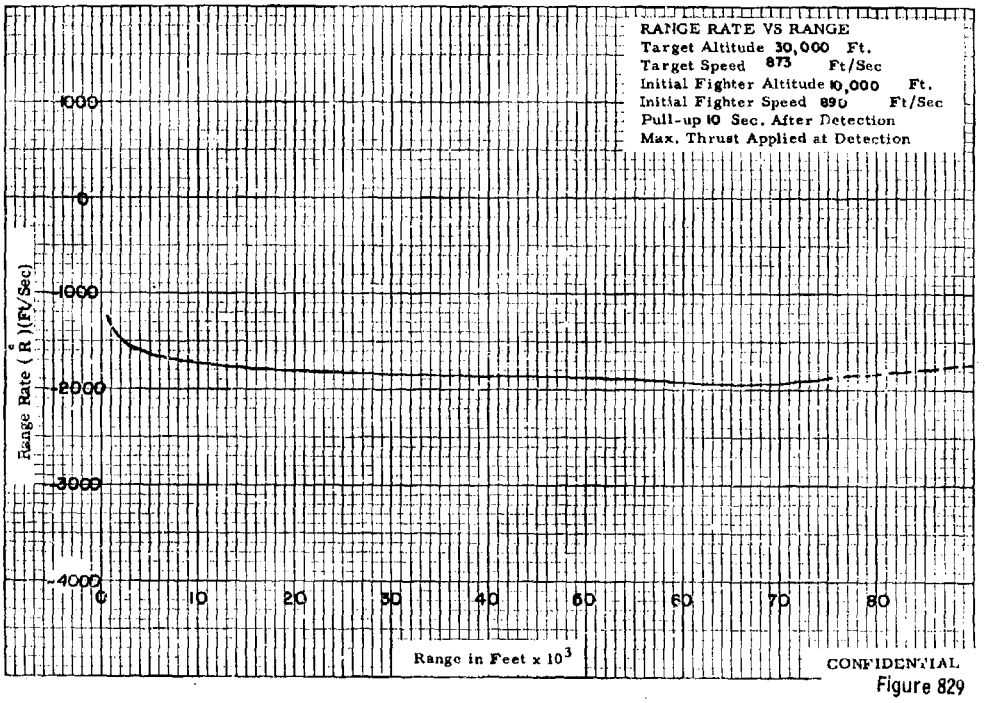

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊗ = R Min ...C L = C L Max
Range (R) (Ft x 10^3)
Time From Detection in Seconds

Figure 828

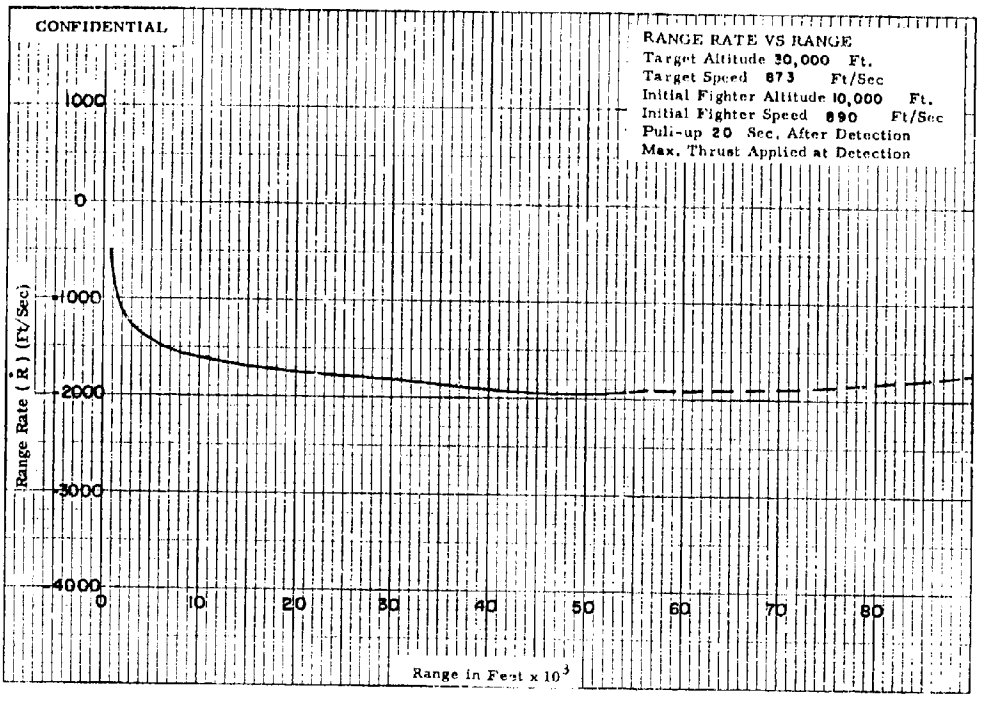
CONFIDENTIAL





CONFIDENTIAL

Figure 829


CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ) (Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³

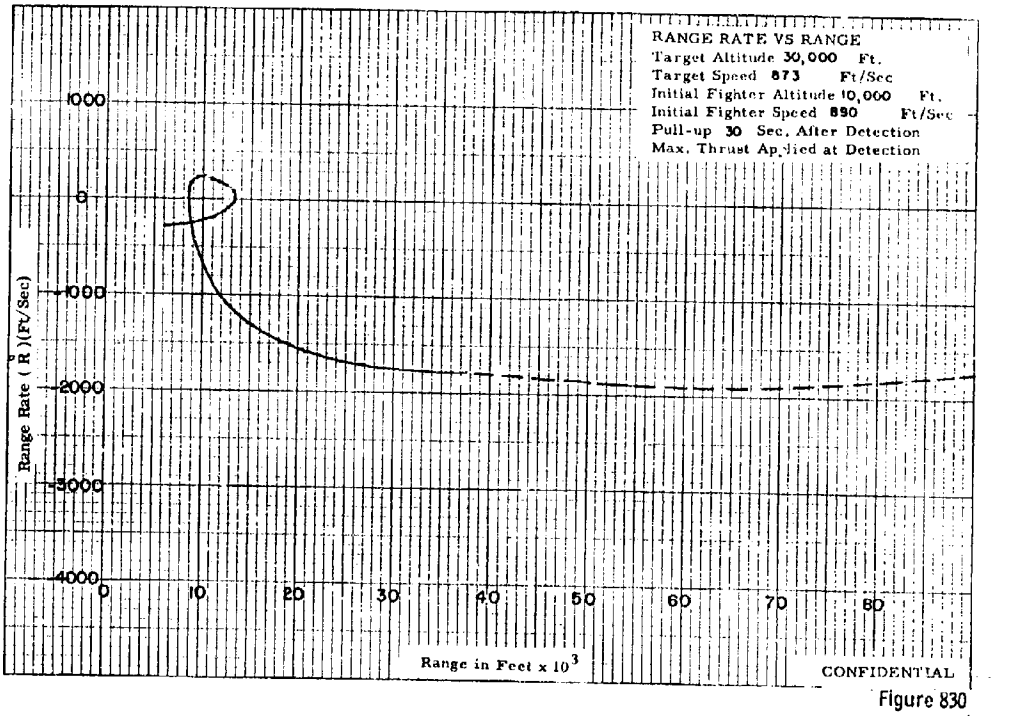
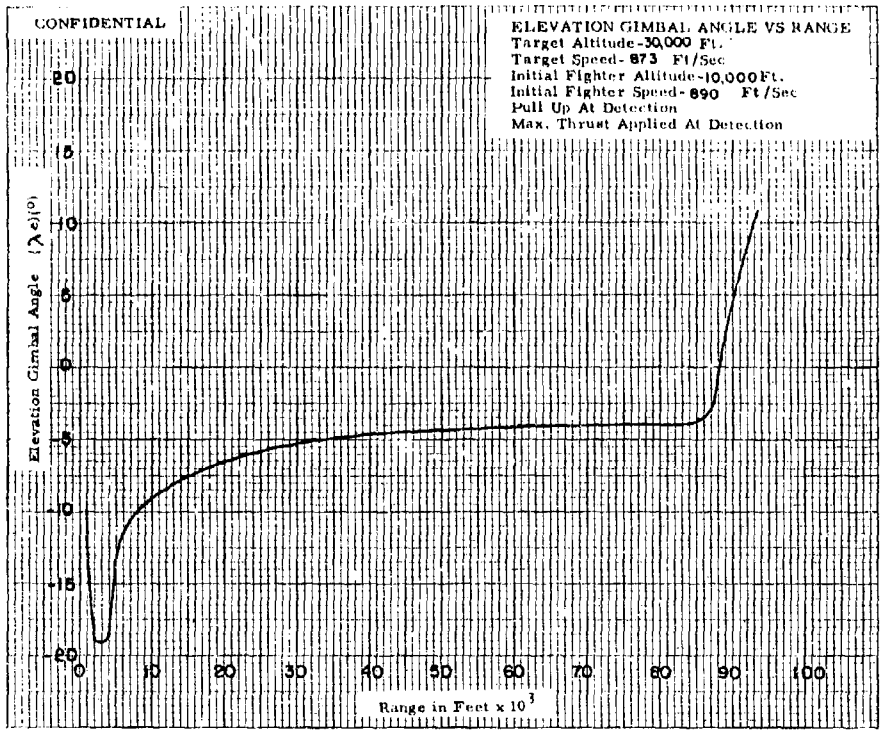

RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Range Rate (Ṙ)(Ft/Sec)
1000
0
-1000
-2000
-3000
-4000
0
10
20
30
40
50
60
70
80
Range in Feet x 10³
CONFIDENTIAL

Figure 830


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull Up At Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λ e)(°)
20
15
10
5
0
-5
-10
-15
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

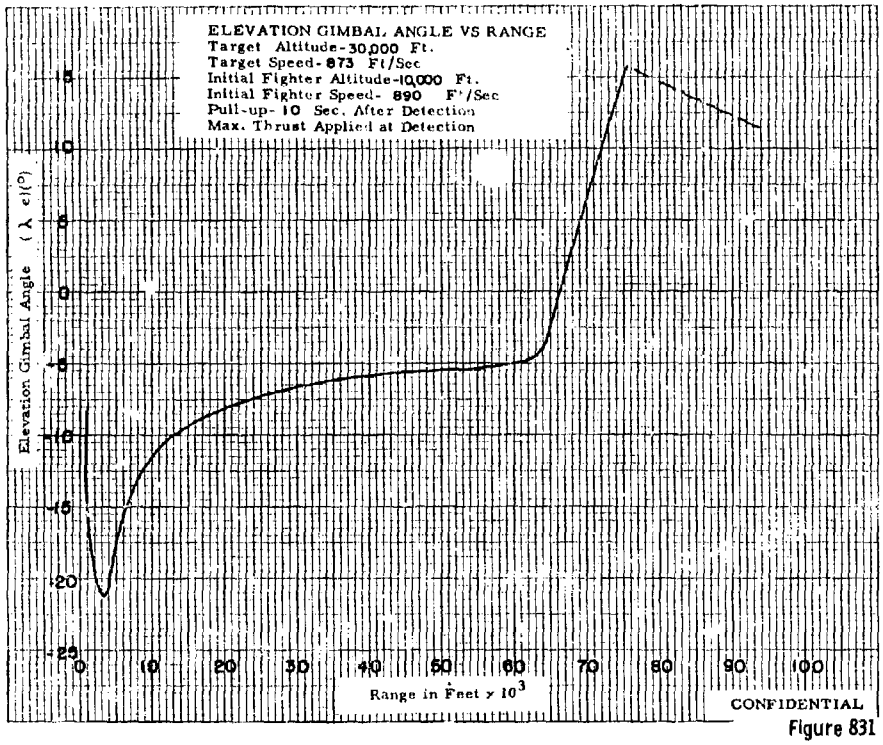
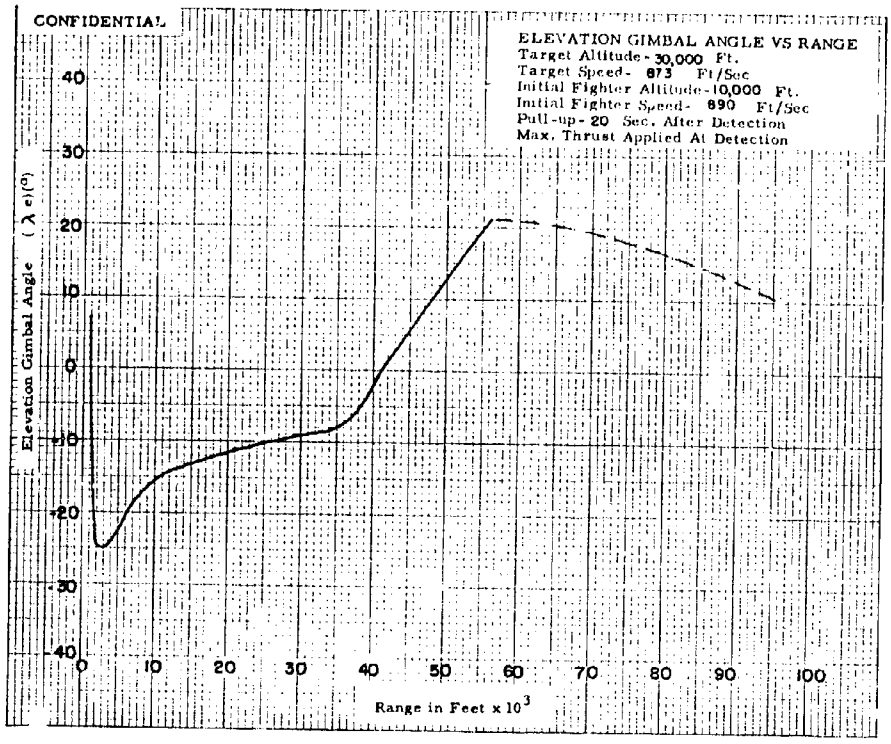

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Gimbal Angle (λ e)(°)
15
10
5
0
-5
-10
-15
-20
-25
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 831


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude - 30,000 Ft.
Target Speed - 873 Ft/Sec
Initial Fighter Altitude - 10,000 Ft.
Initial Fighter Speed - 890 Ft/Sec
Pull-up - 20 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λ e)(°)
40
30
20
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

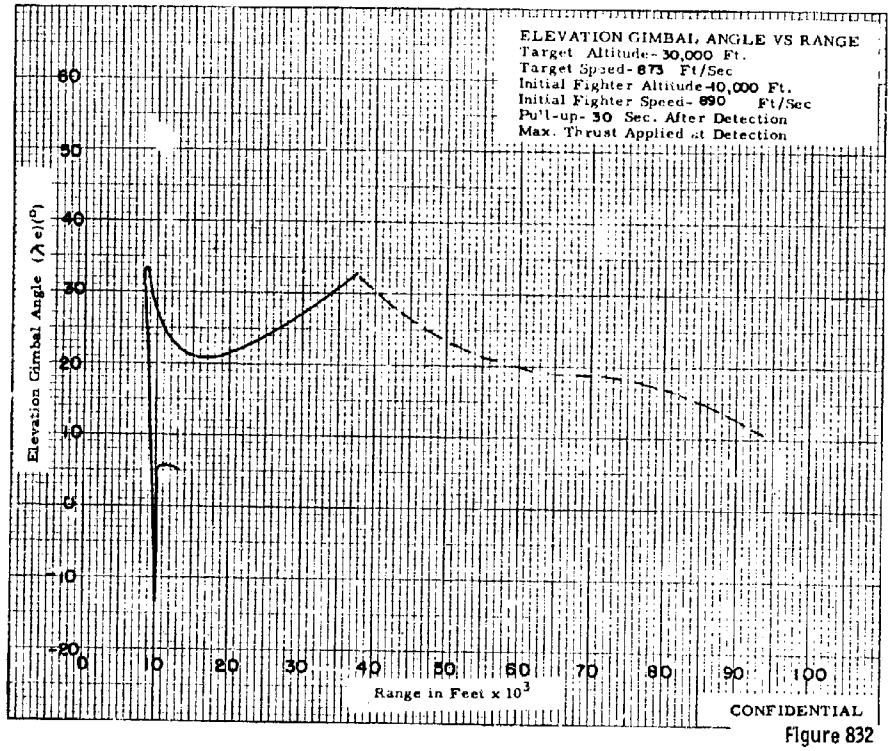
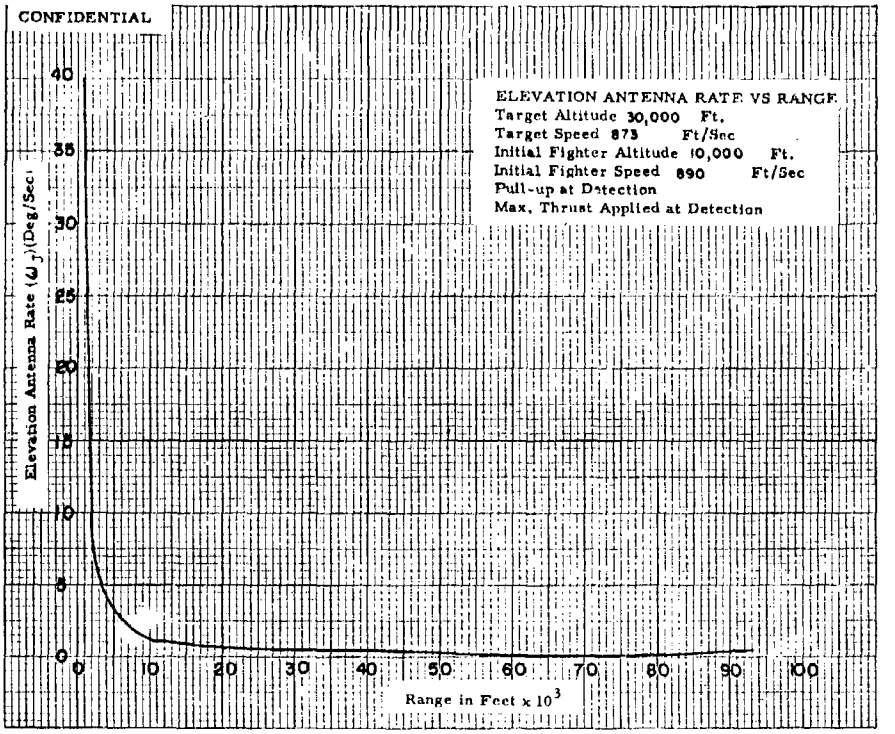

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude - 30,000 Ft.
Target Speed - 873 Ft/Sec
Initial Fighter Altitude - 10,000 Ft.
Initial Fighter Speed - 890 Ft/Sec
Pull-up - 30 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Gimbal Angle (λ e)(°)
60
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 832


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_T)(Deg/Sec)
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

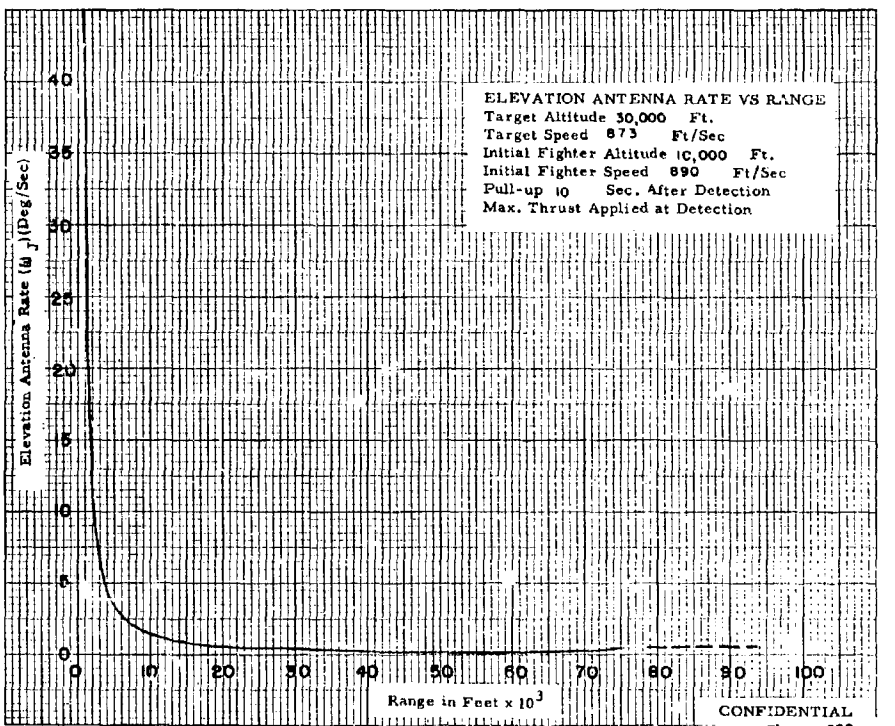
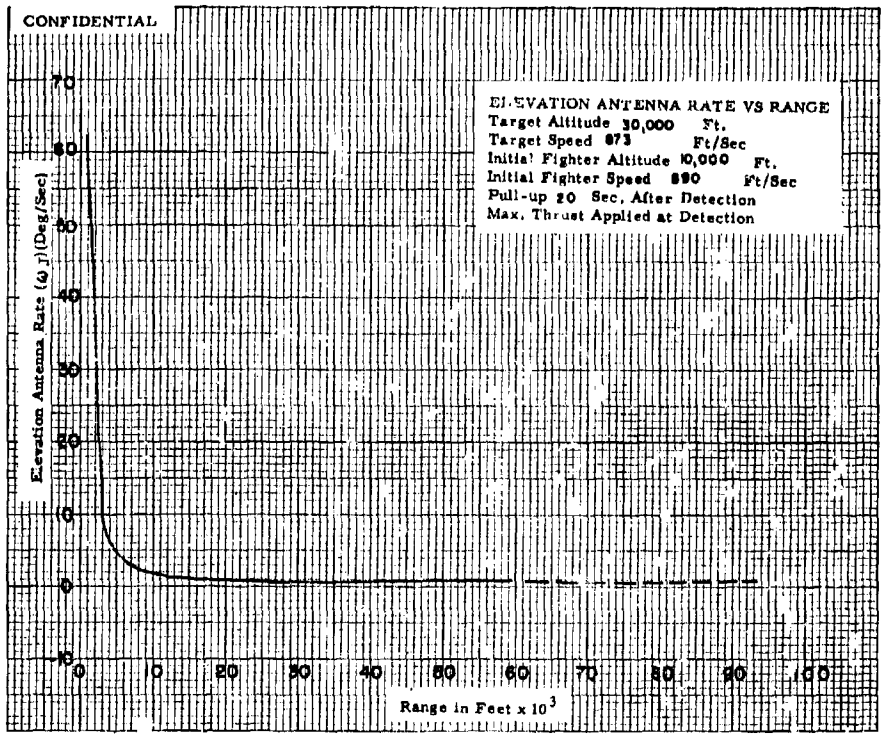

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_T)(Deg/Sec)
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 833


ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_T)(Deg/Sec)
70
60
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

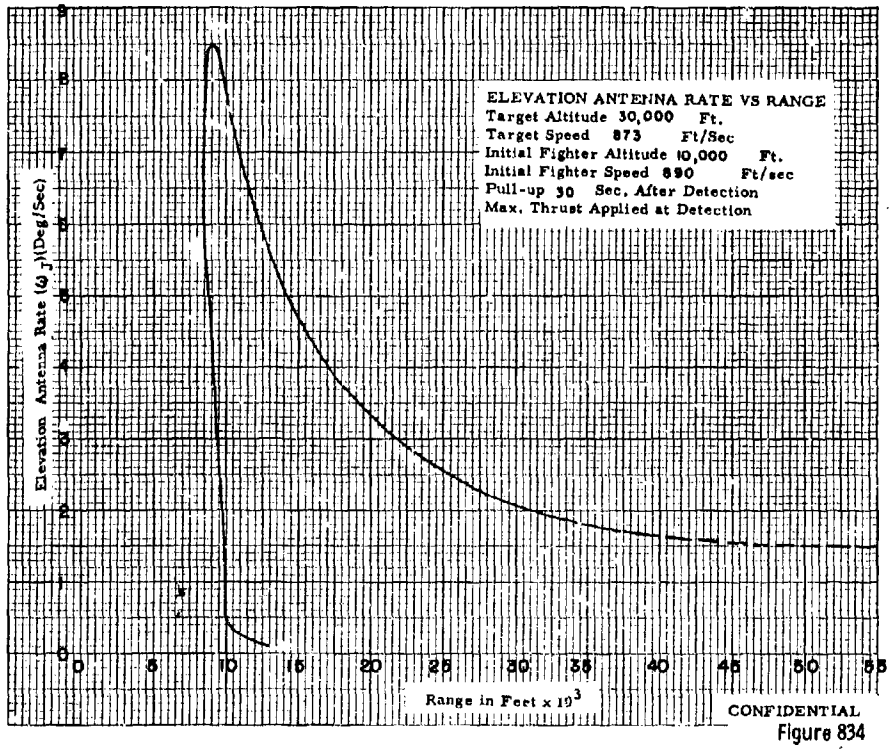

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω_T)(Deg/Sec)
9
8
7
6
5
4
3
2
1
0
0
5
10
15
20
25
30
35
40
45
50
55
Range in Feet x 10^3

Figure 834

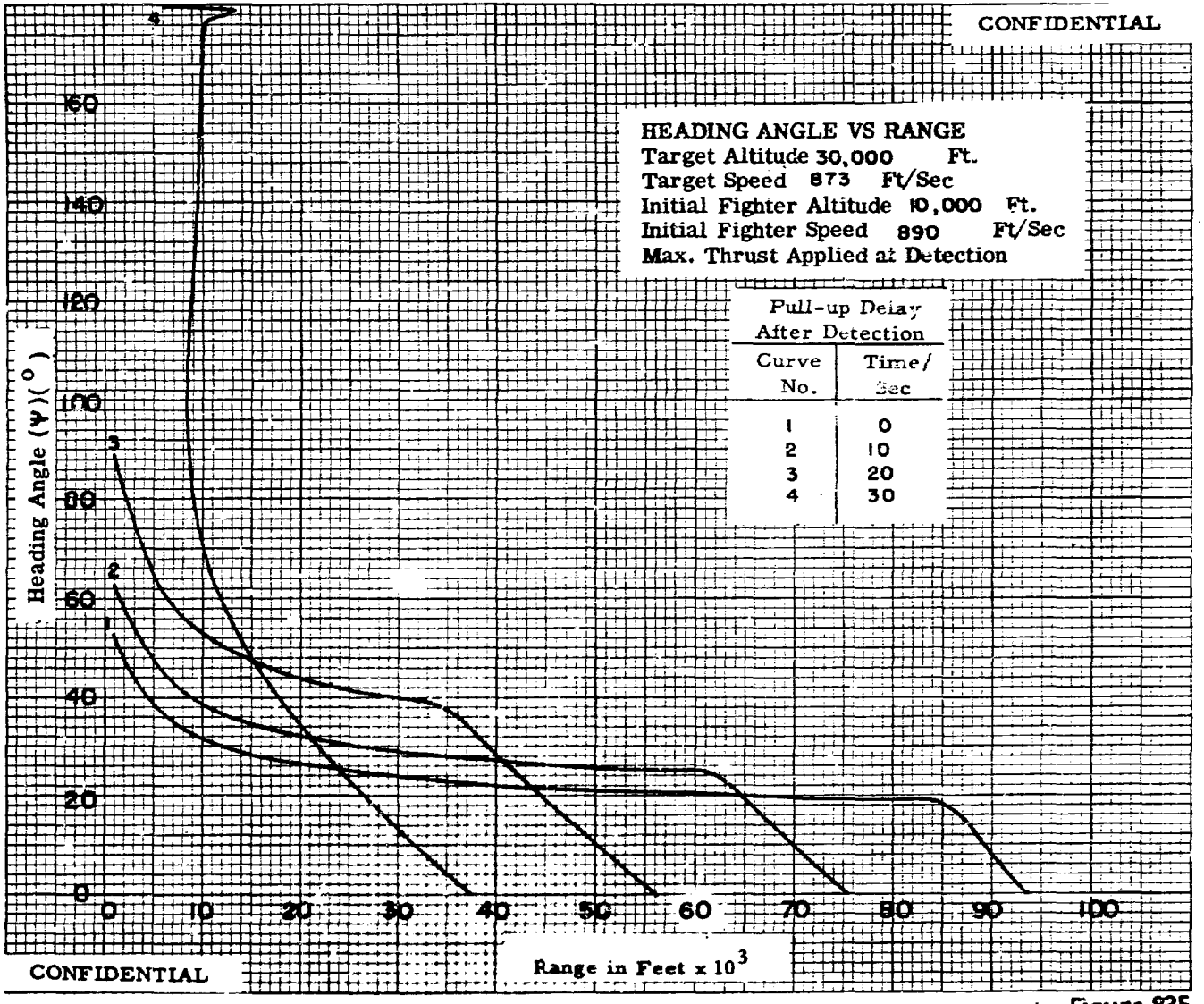
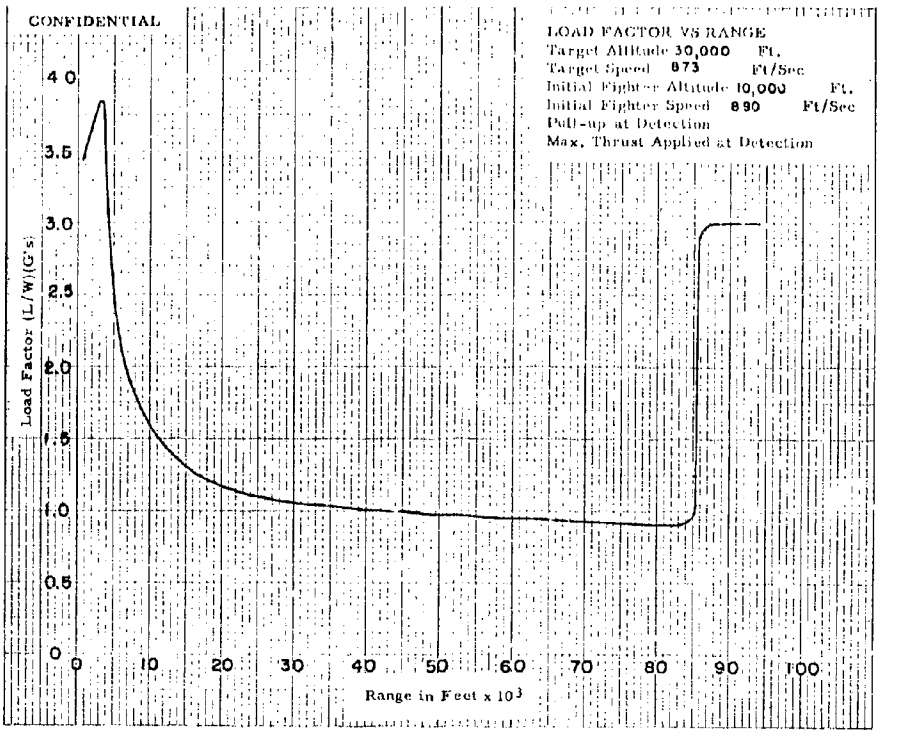

HEADING ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
3 | 20
4 | 30
Heading Angle (Ψ)(°)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90 100
0 20 40 60 80 100 120 140 160

Figure 835


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10³

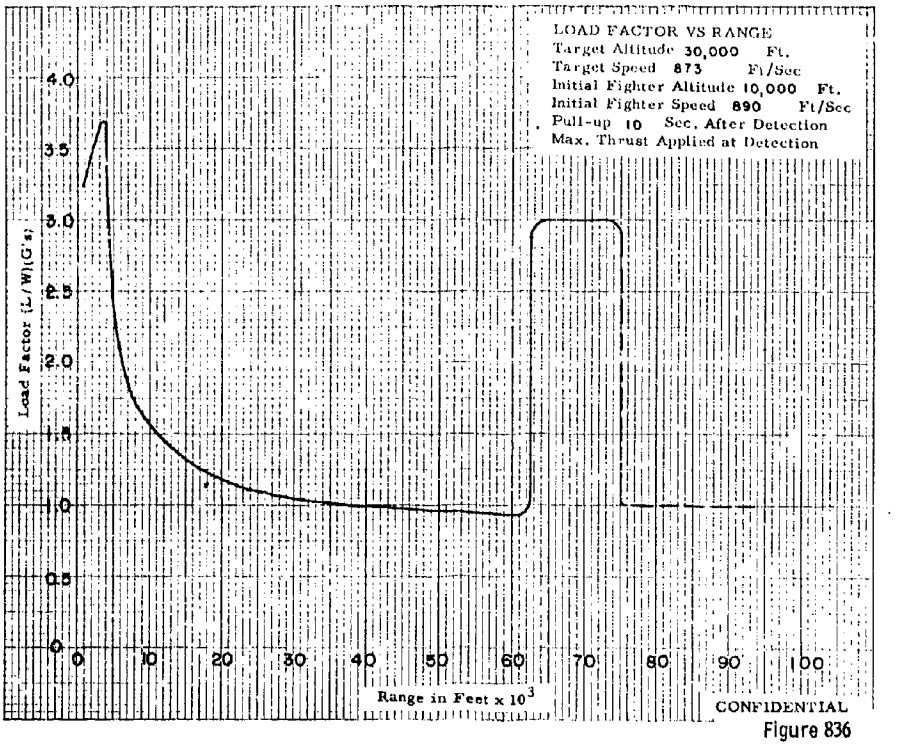
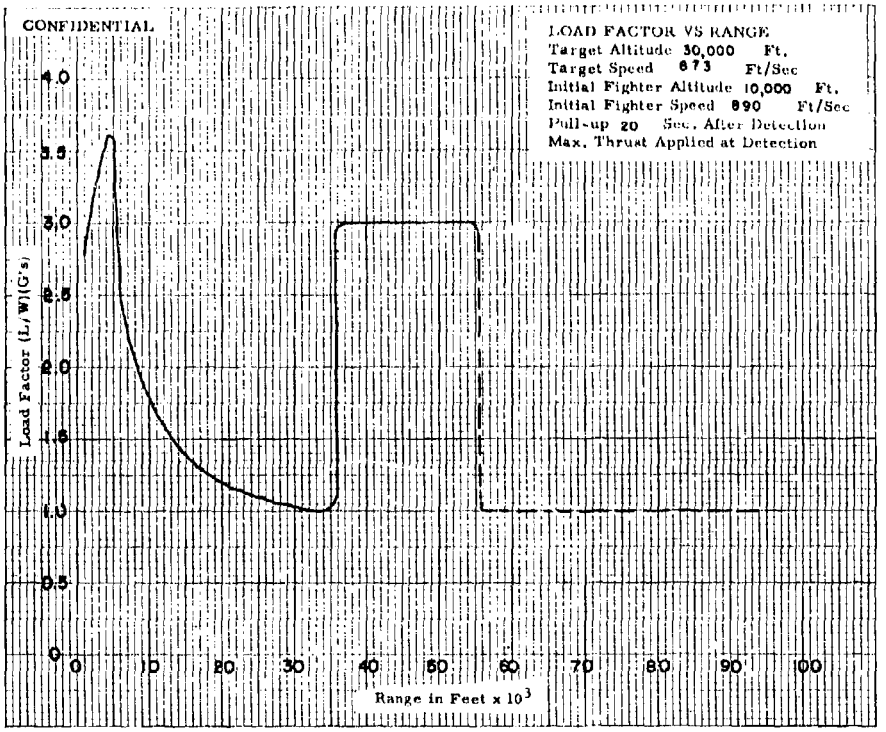

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10³
CONFIDENTIAL

Figure 836


LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

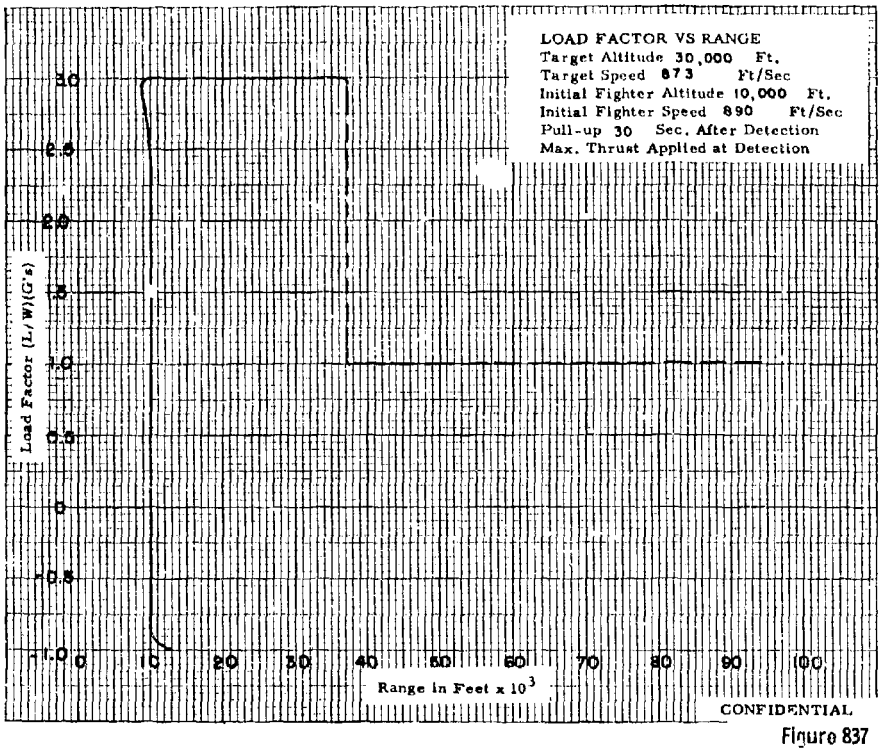
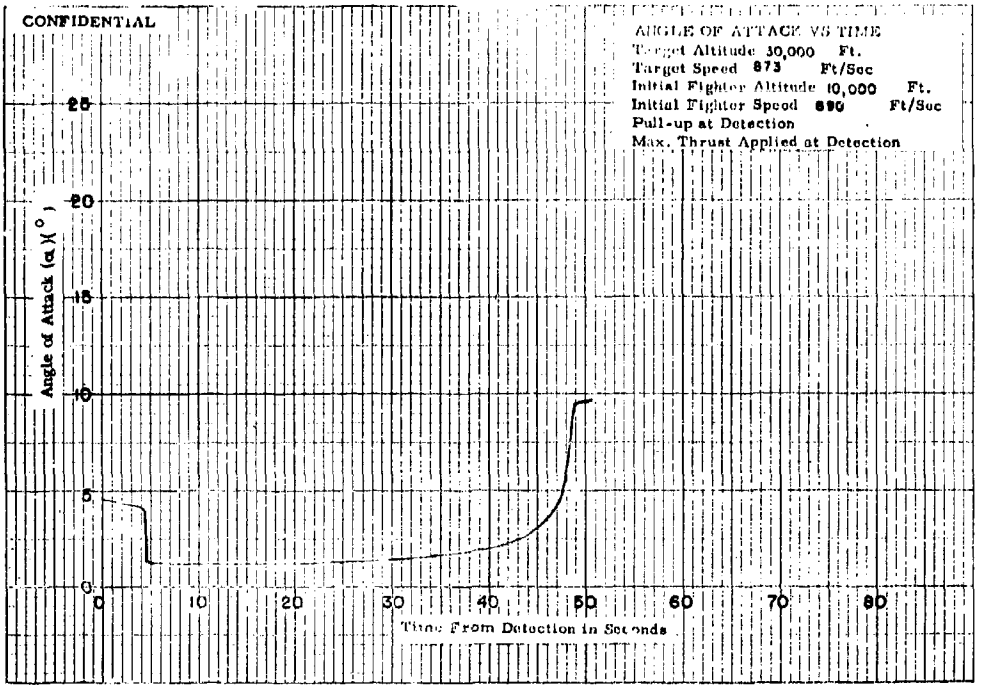
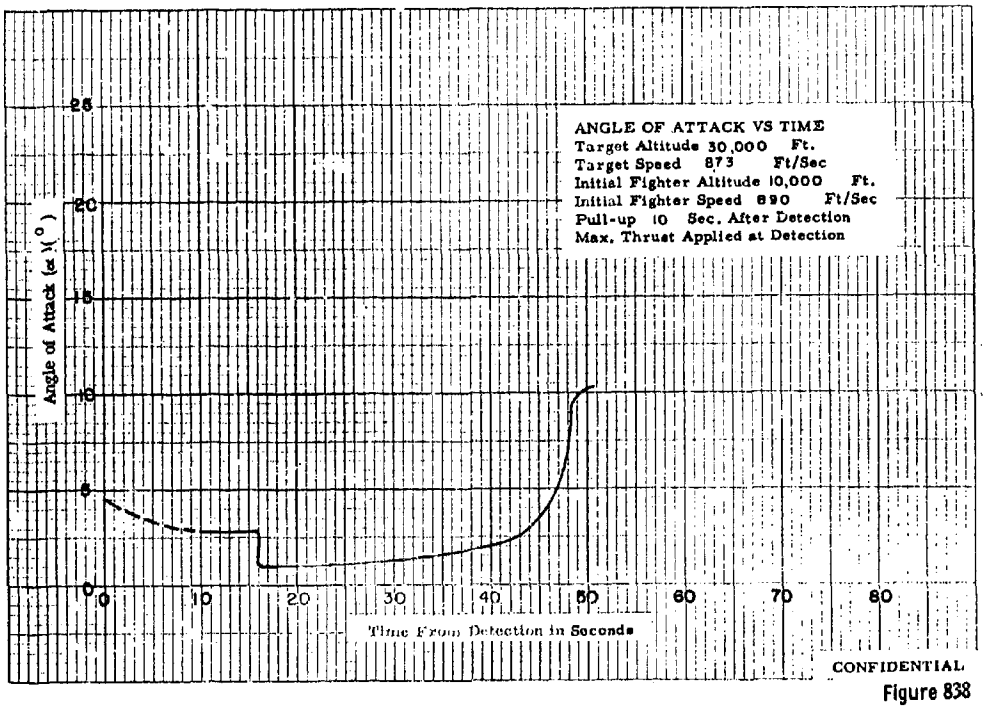

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 837

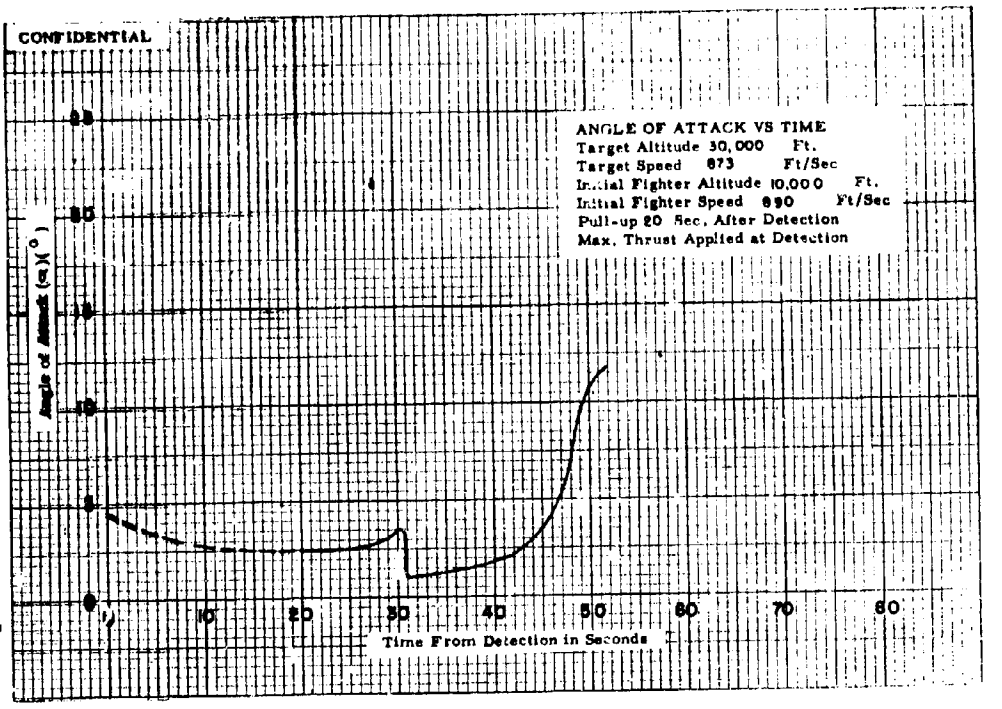
CONFIDENTIAL





CONFIDENTIAL

Figure 838


CONFIDENTIAL
ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Angle of Attack (α) (°)
Time From Detection in Seconds

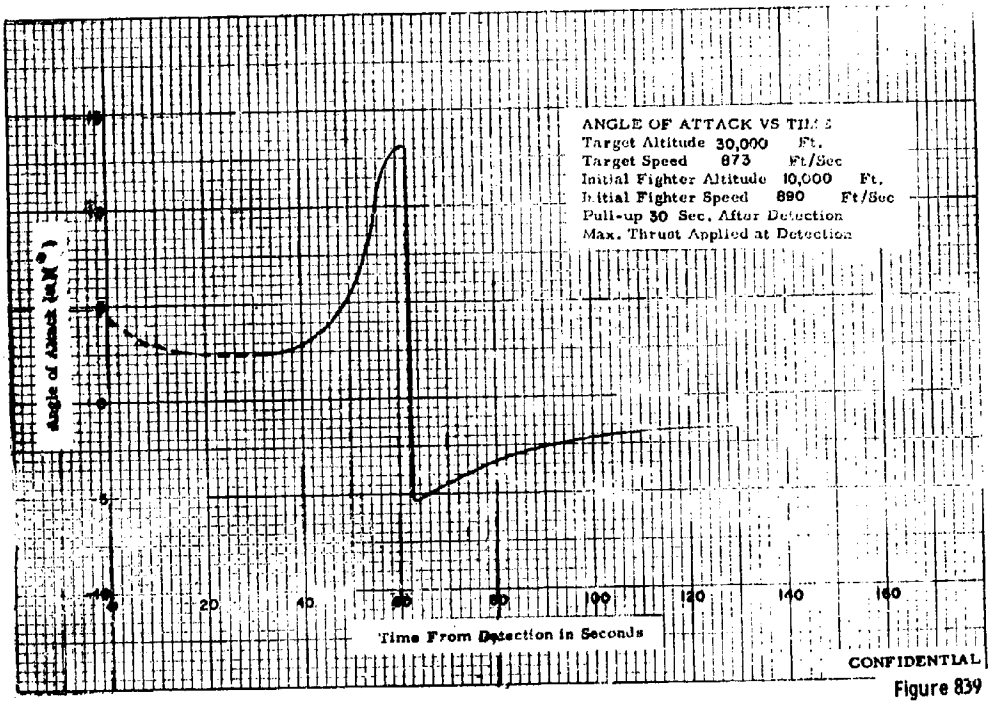
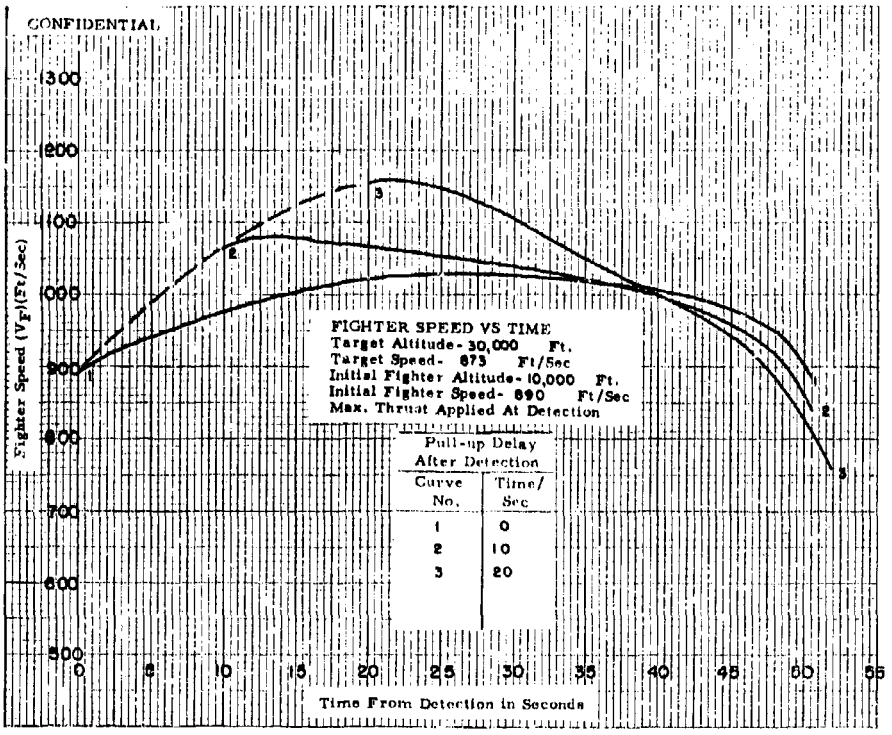

ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Angle of Attack (α) (°)
Time From Detection in Seconds
CONFIDENTIAL

Figure 839


FIGHTER SPEED VS TIME
Target Altitude- 30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 10,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 20
Fighter Speed (V_F)(Ft/Sec)
Time From Detection in Seconds

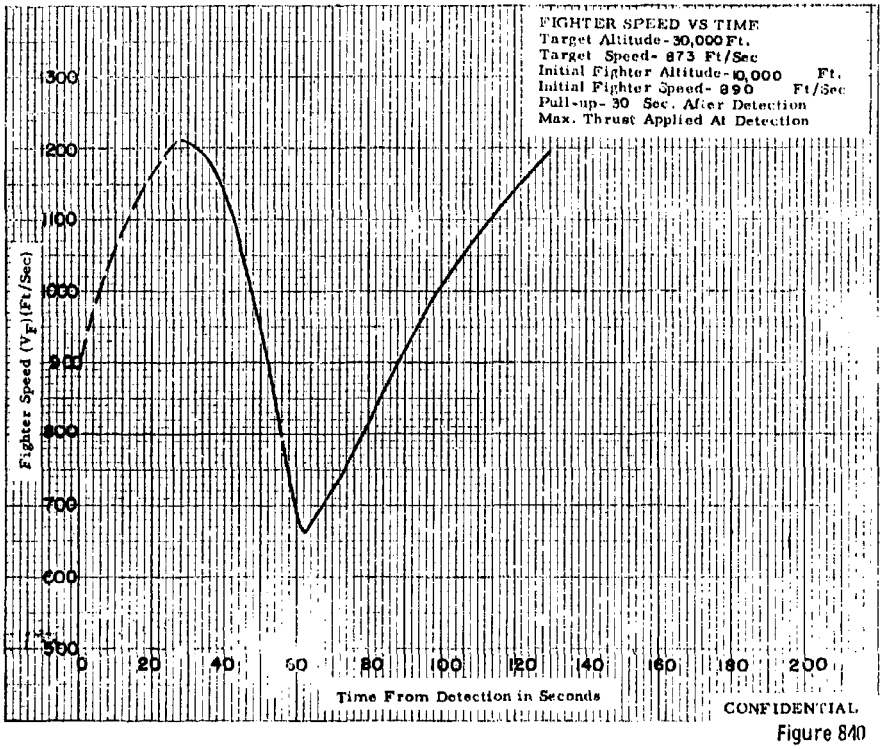
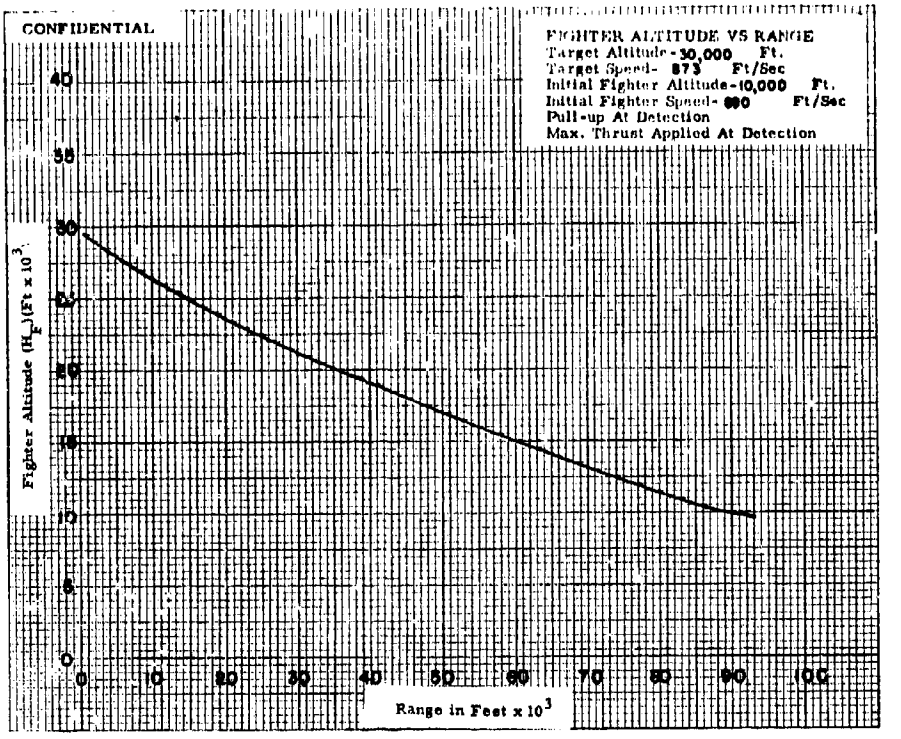

FIGHTER SPEED VS TIME
Target Altitude- 30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 10,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up- 30 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Speed (V_F)(Ft/Sec)
Time From Detection in Seconds

Figure 840


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up At Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3

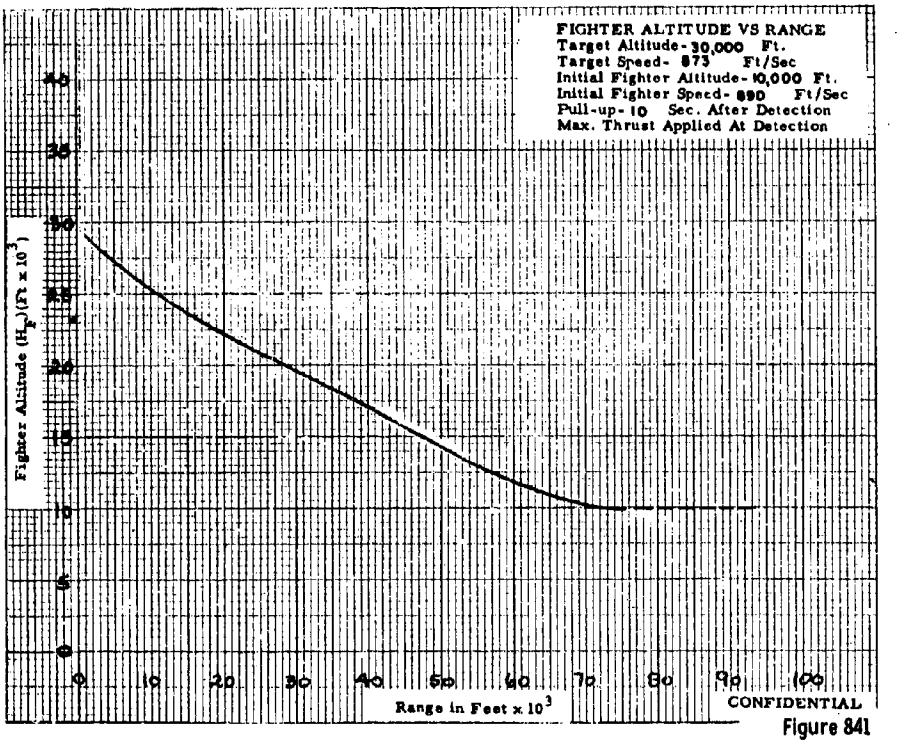
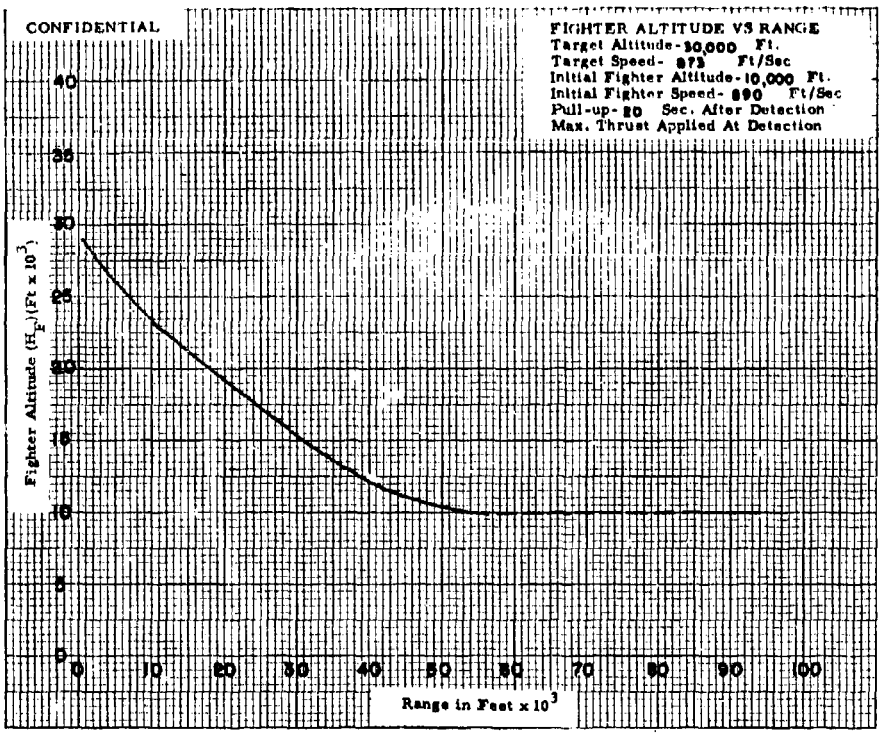

FIGHTER ALTITUDE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up- 10 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3
CONFIDENTIAL

Figure 841


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
40
35
30
25
20
15
10
5
0
0 10 20 30 40 50 60 70 80 90 100
Range in Feet x 10^3

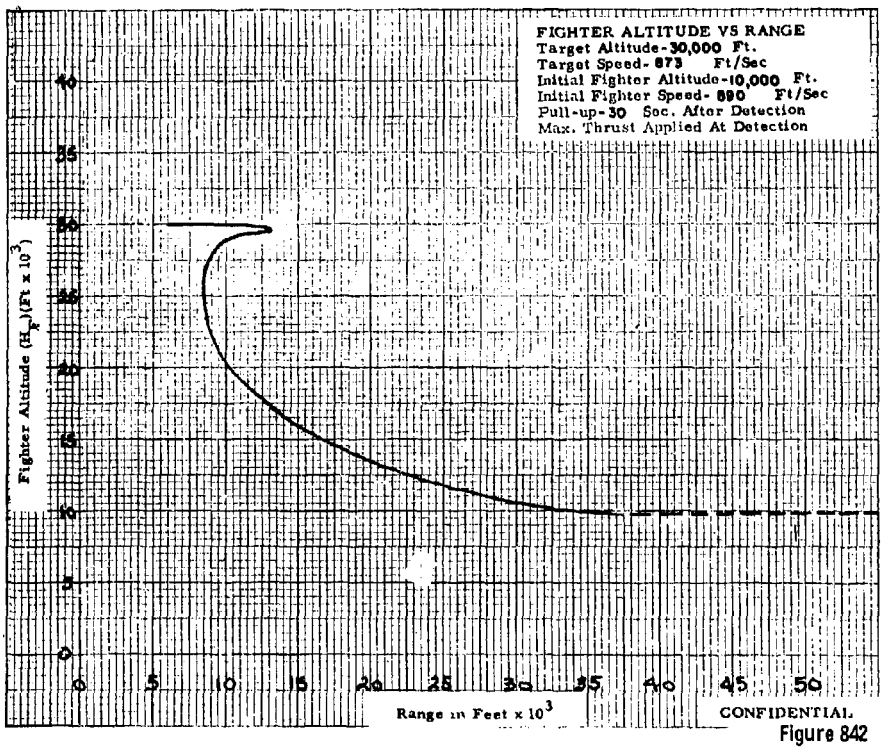
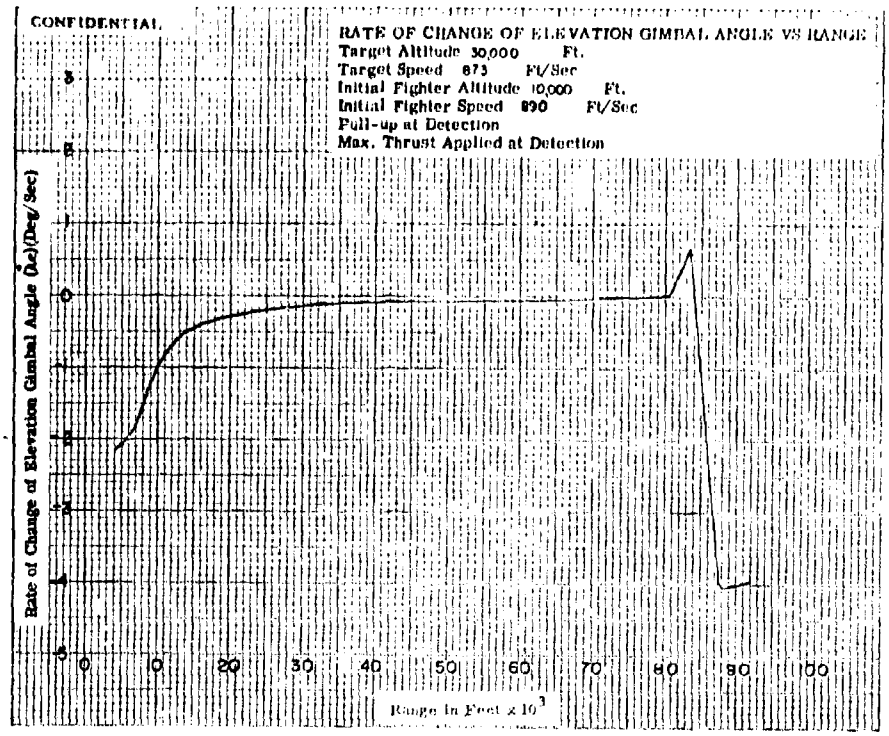

FIGHTER ALTITUDE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up-30 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
40
35
30
25
20
15
10
5
0
0 5 10 15 20 25 30 35 40 45 50
Range in Feet x 10^3
CONFIDENTIAL

Figure 842


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (Δε)(Deg/Sec)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90
100

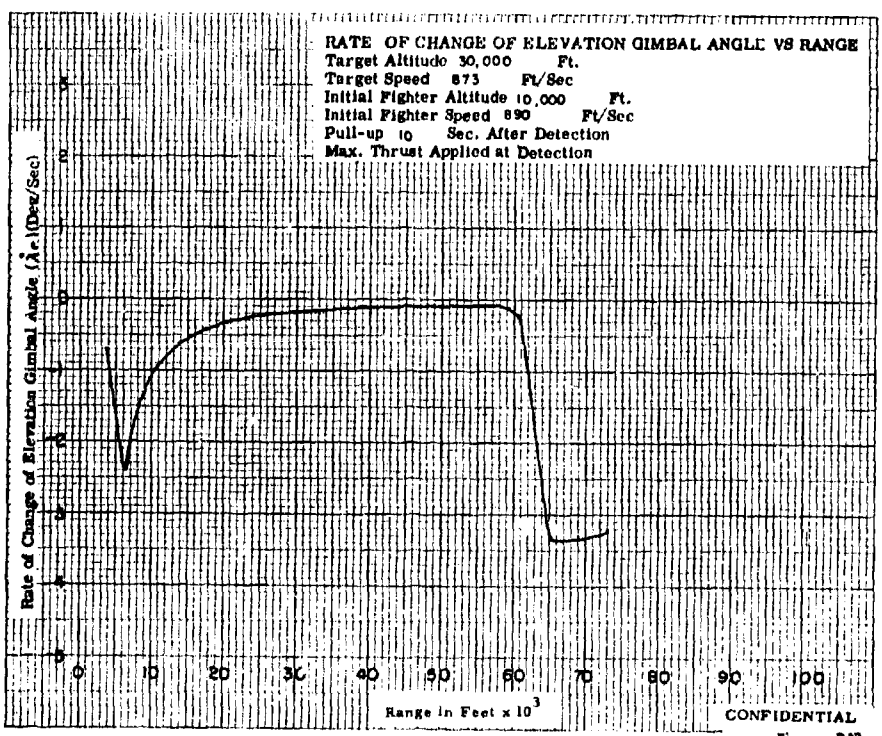
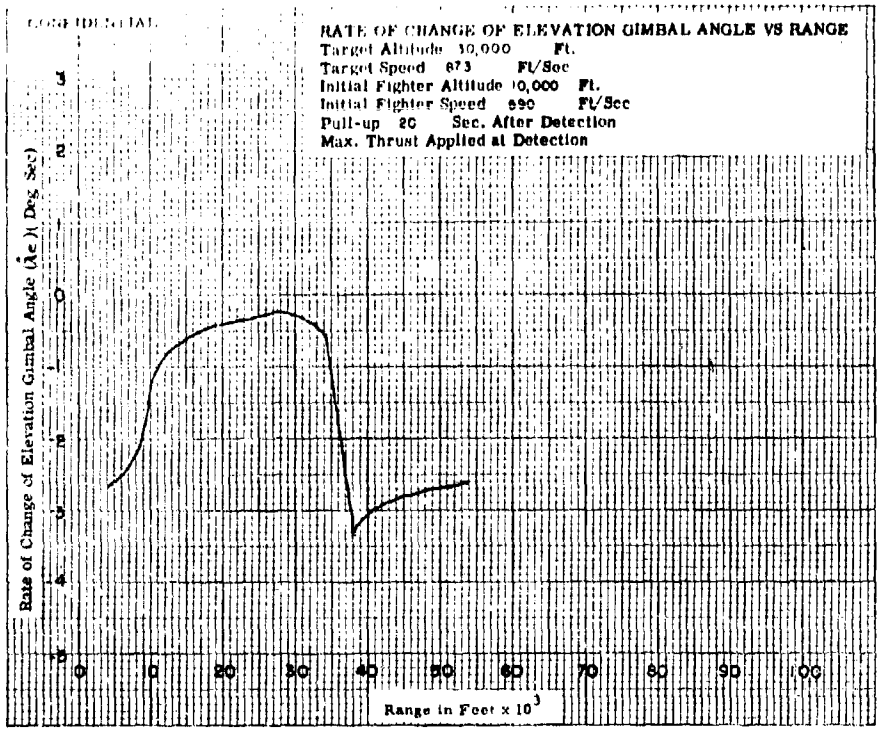

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (Δε)(Deg/Sec)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90
100

Figure 843

CONFIDENTIAL



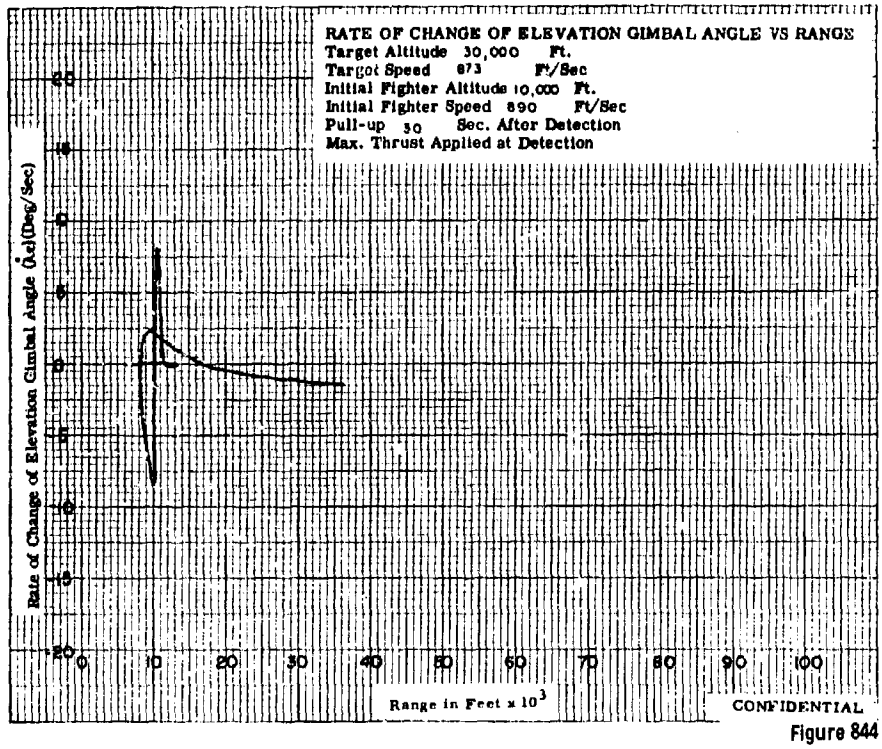


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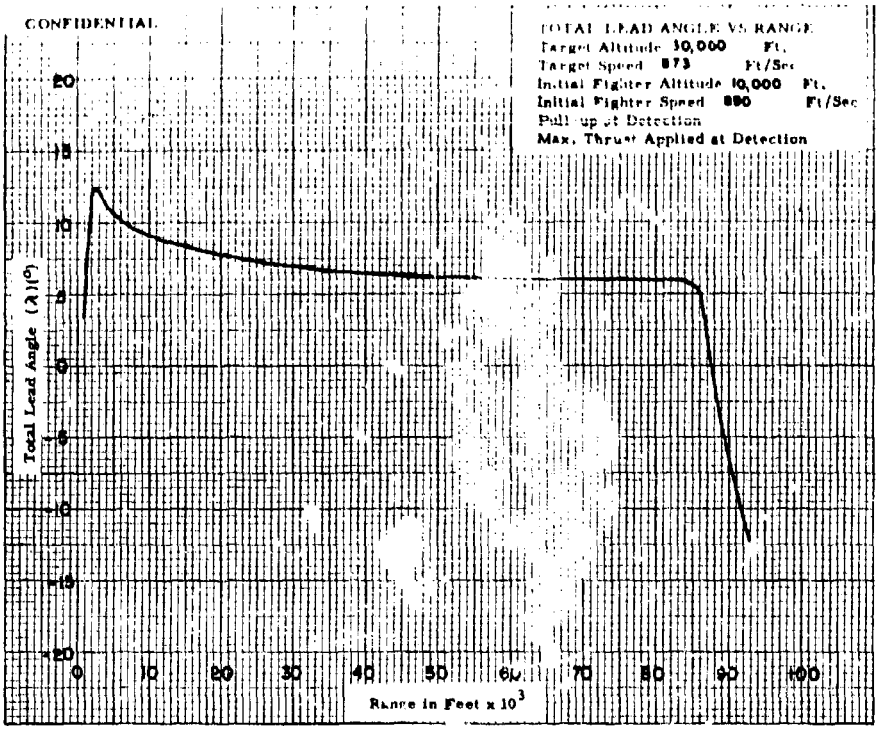
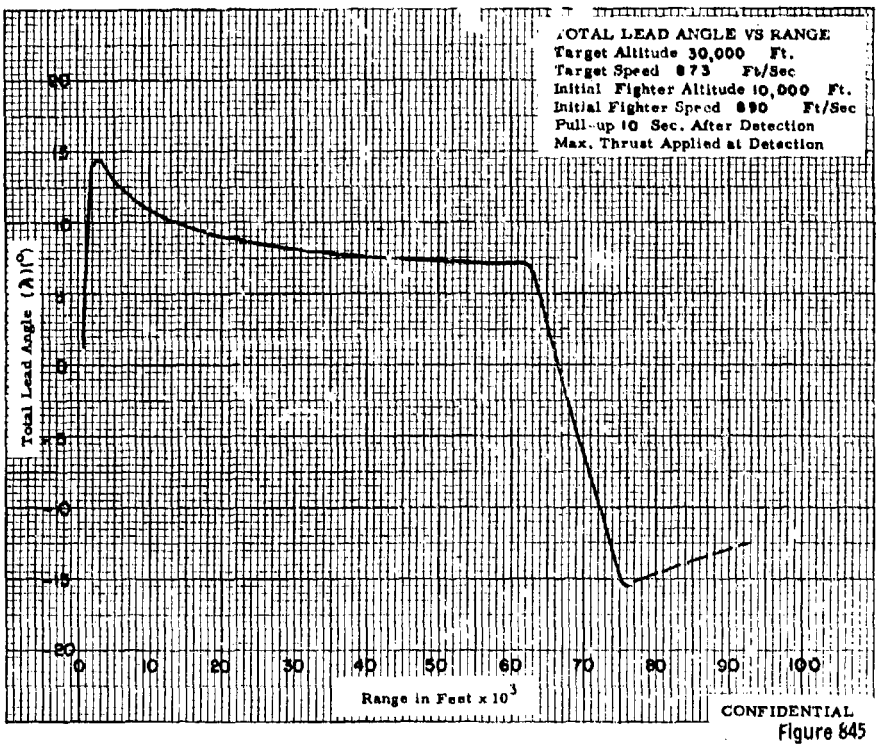
Figure 844

CONFIDENTIAL

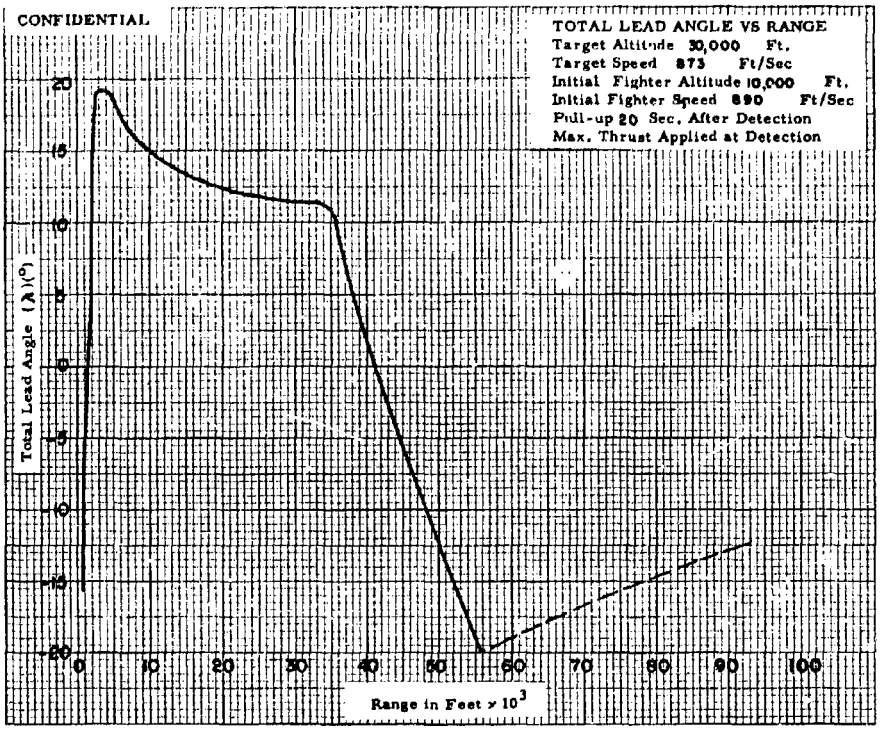


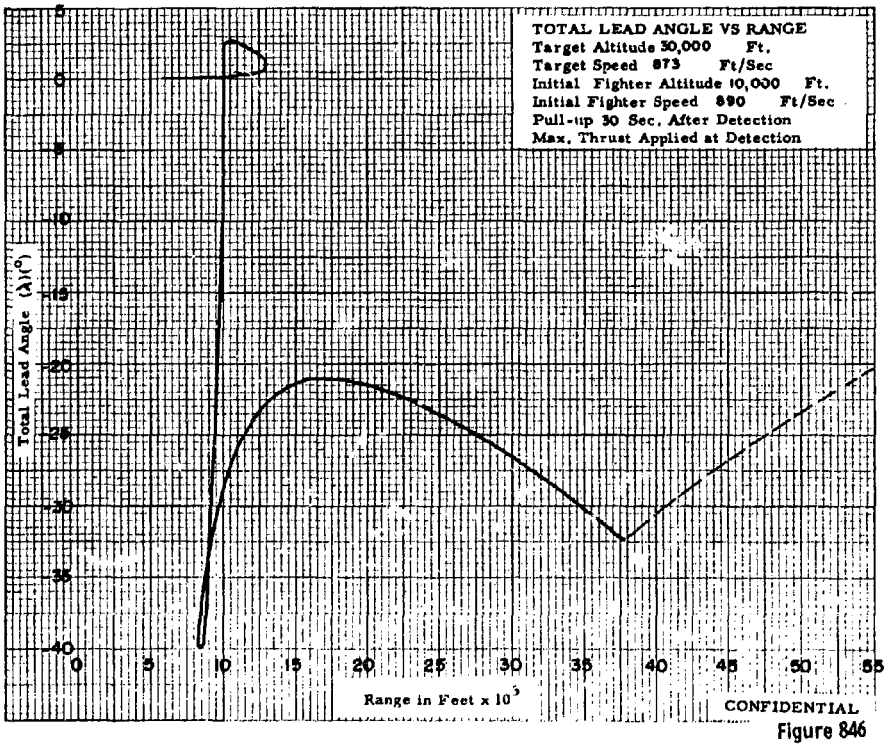


CONFIDENTIAL

Figure 845

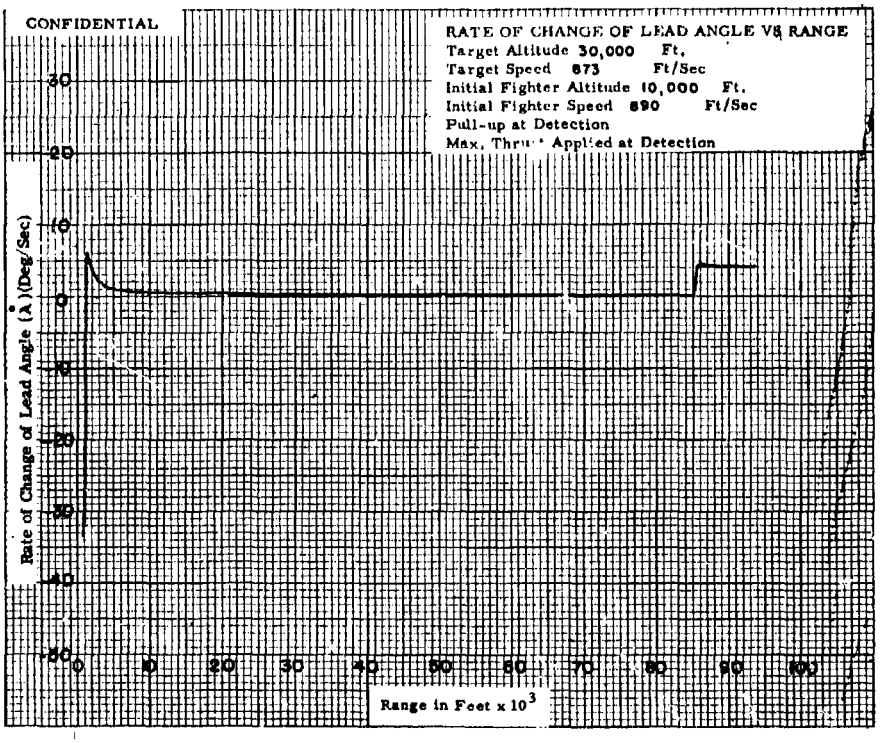
CONFIDENTIAL





CONFIDENTIAL

Figure 846


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
30
20
10
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

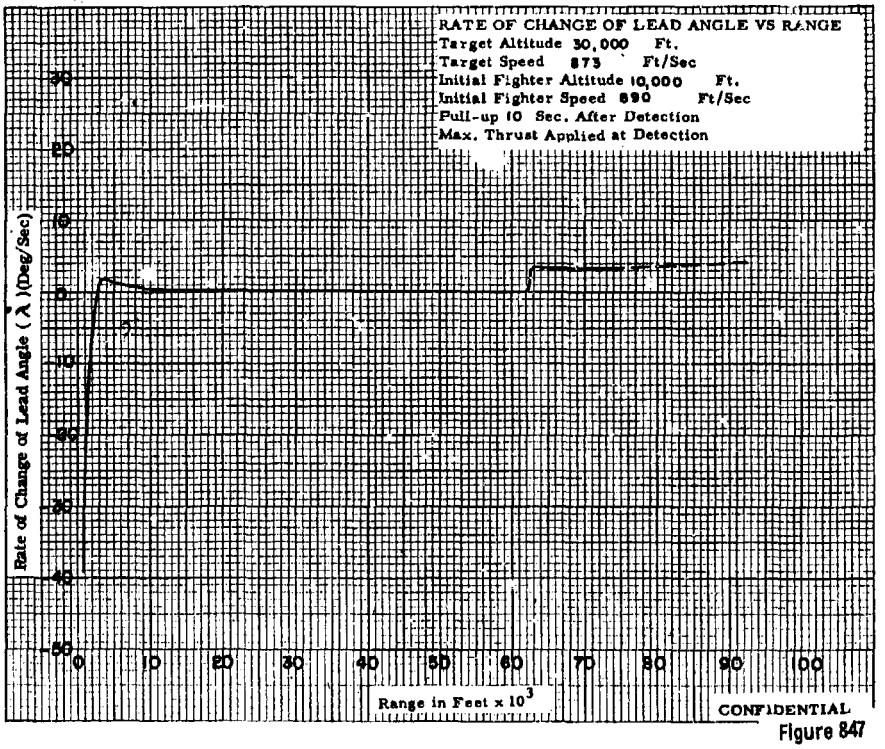
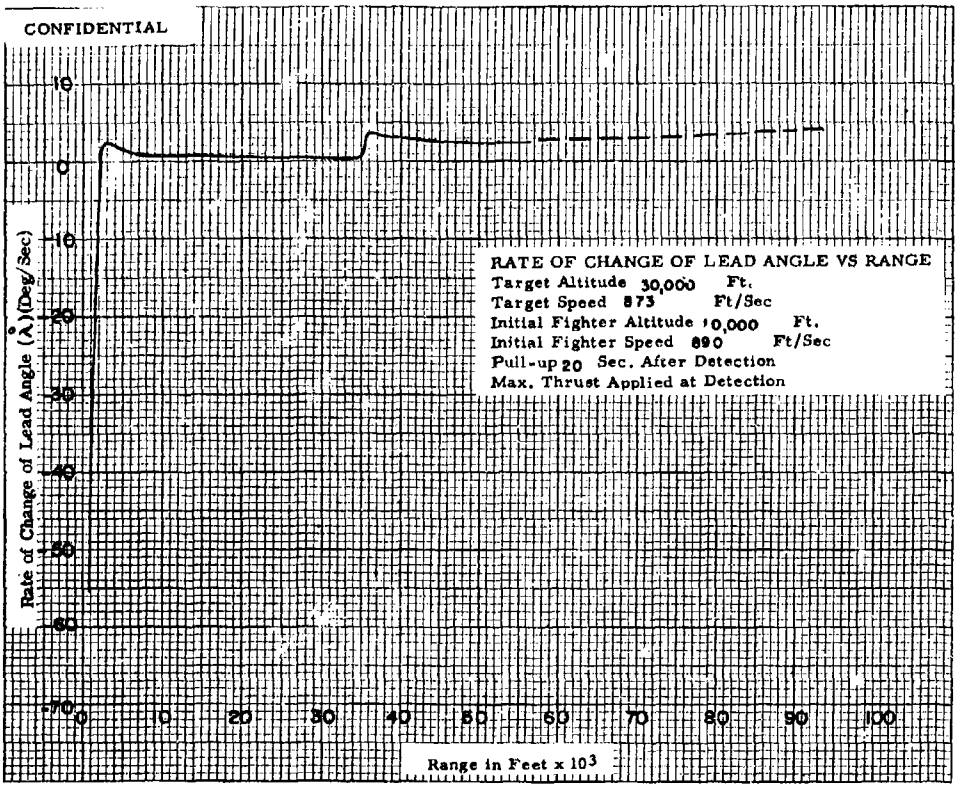
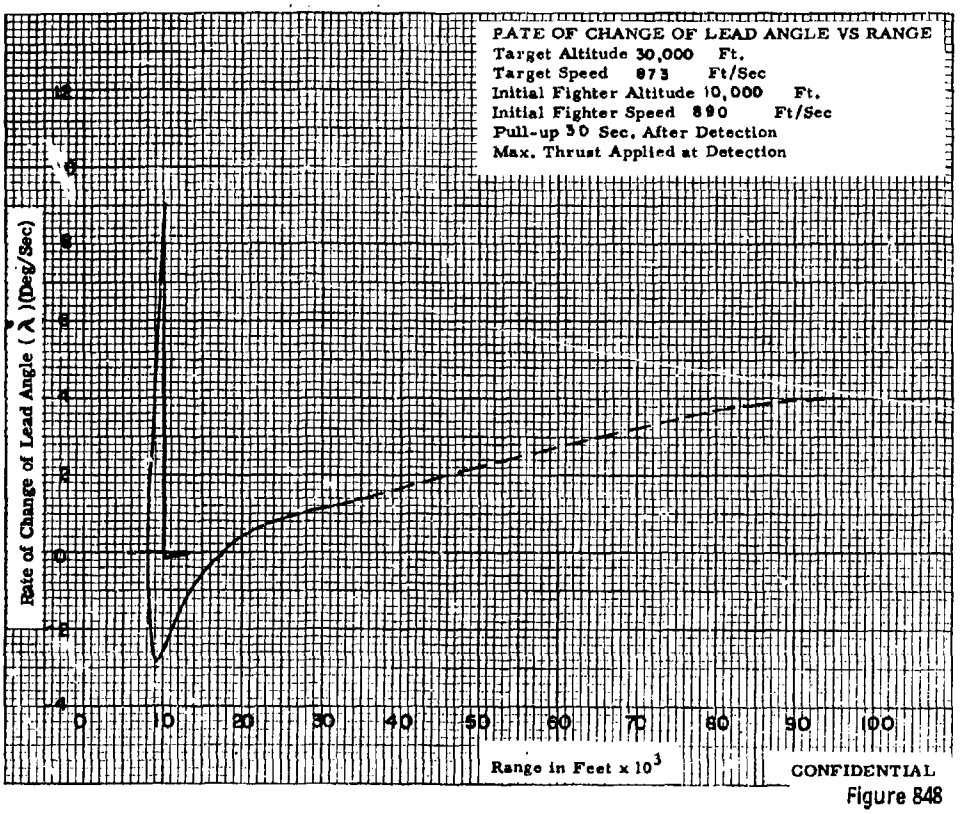

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
30
20
10
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 847

CONFIDENTIAL





CONFIDENTIAL

Figure 848

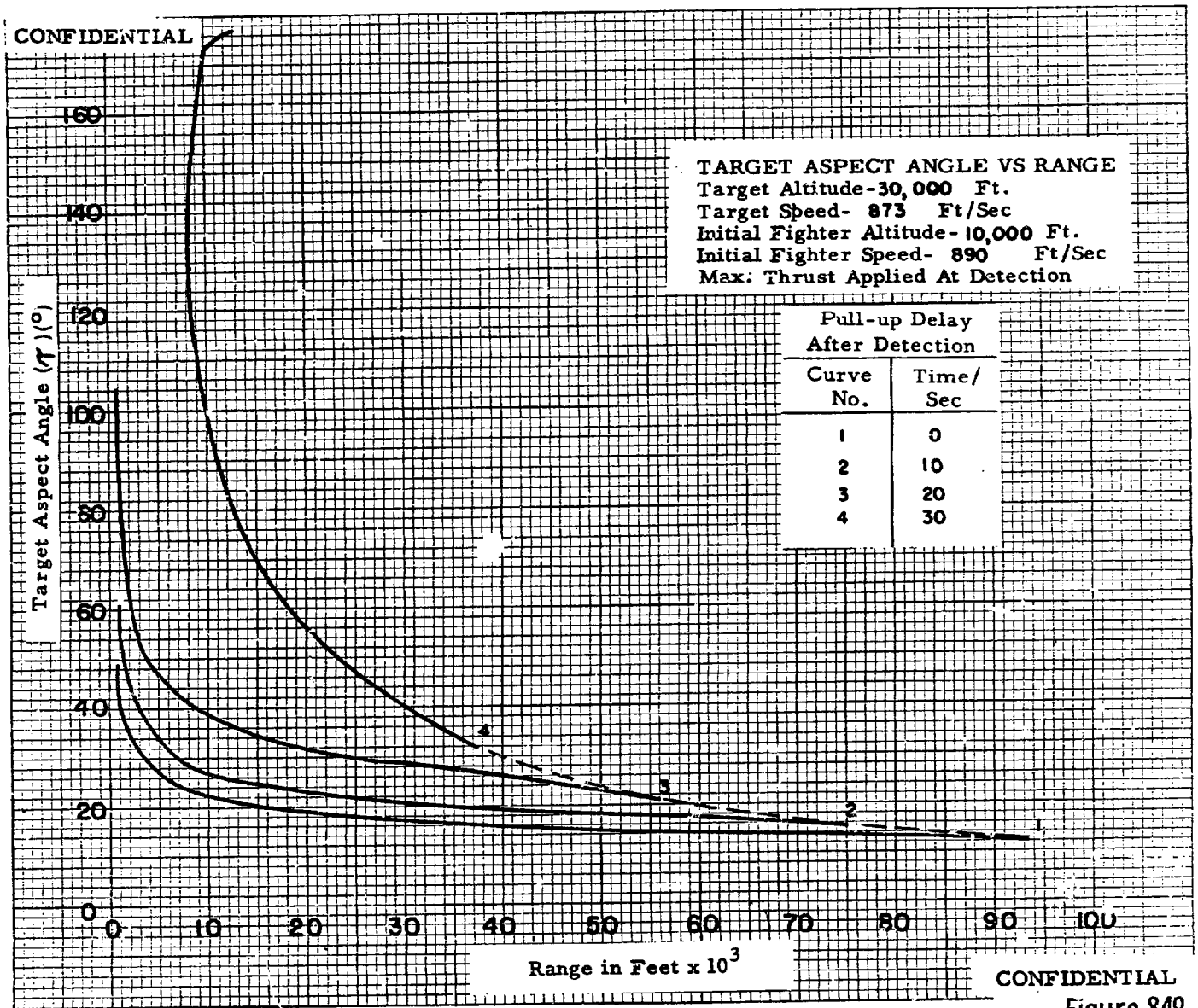

CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude-10,000 Ft.
Initial Fighter Speed- 890 Ft/Sec
Max: Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 20
4 | 30
Target Aspect Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 849

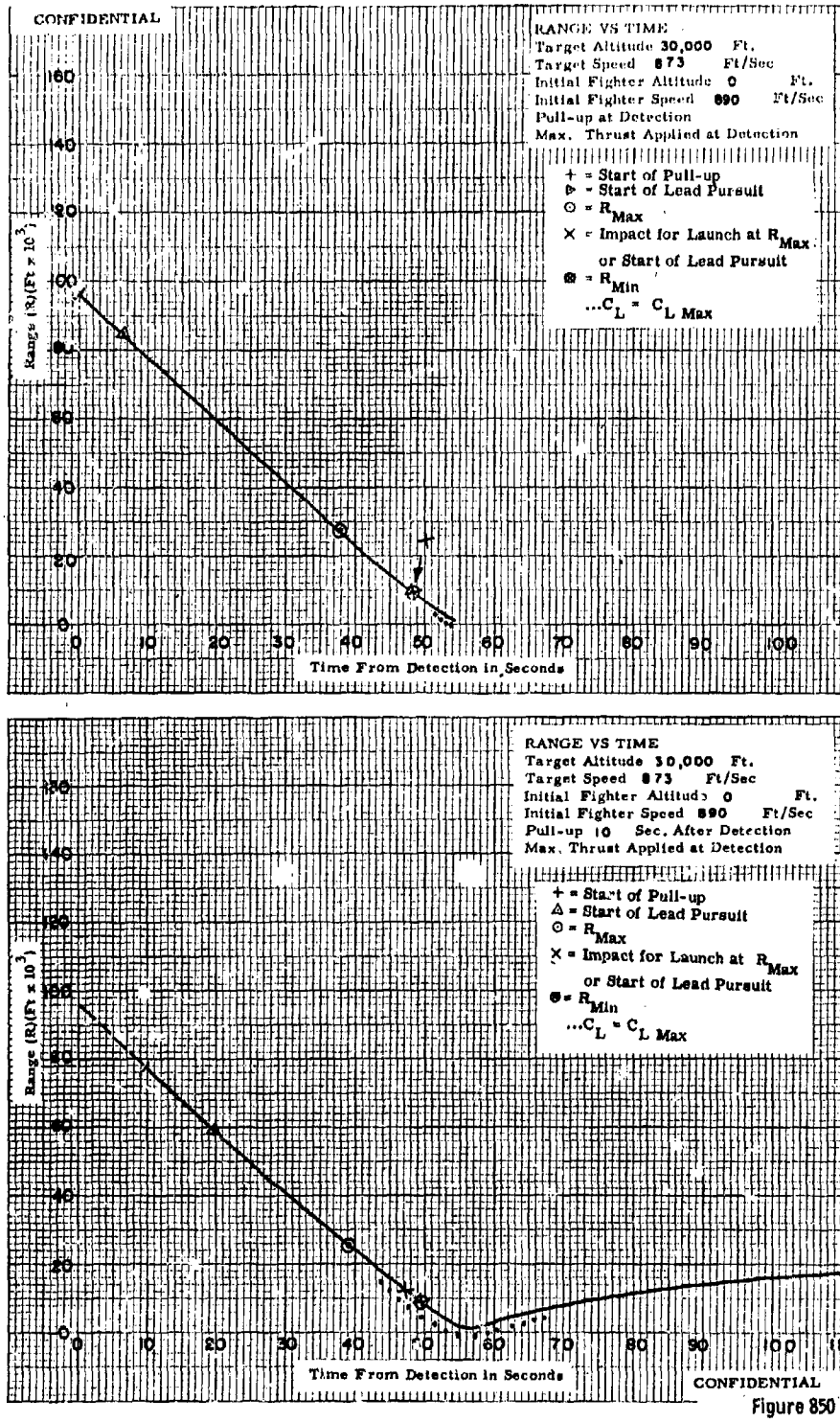
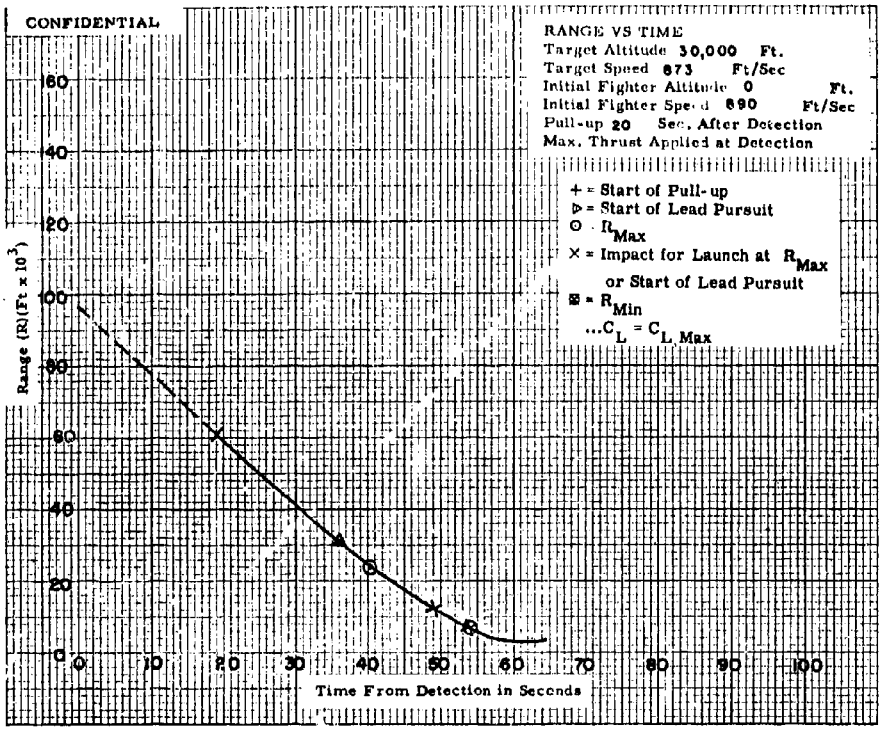

CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 850


CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\,Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds

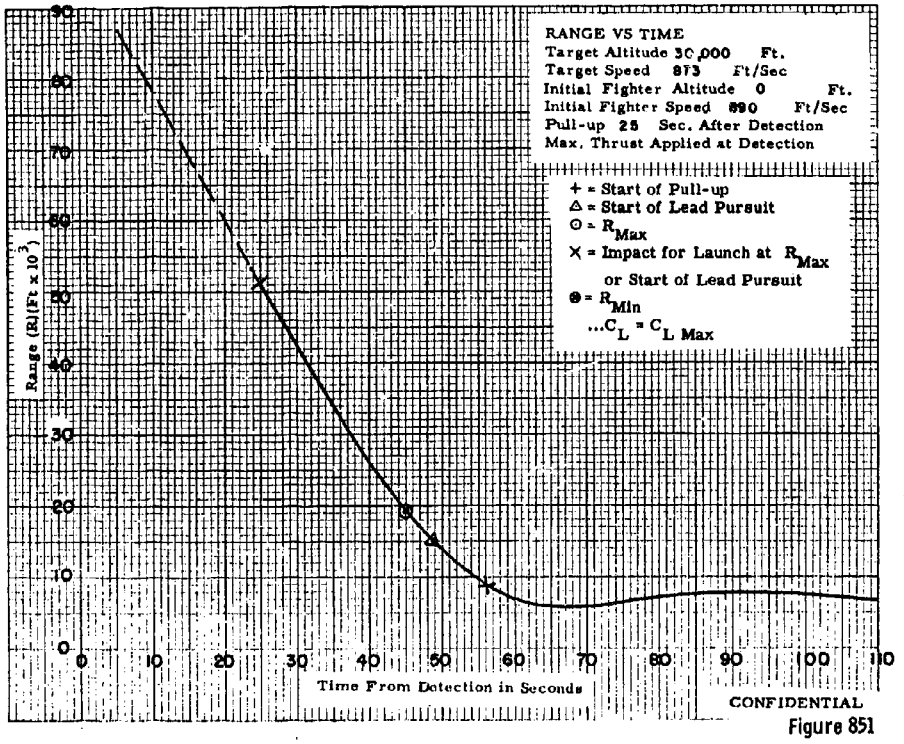

RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
△ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊛ = R_{Min}
...$C_L = C_{L\,Max}$
Range (R)(Ft x 10^3)
Time From Detection in Seconds
CONFIDENTIAL

Figure 851

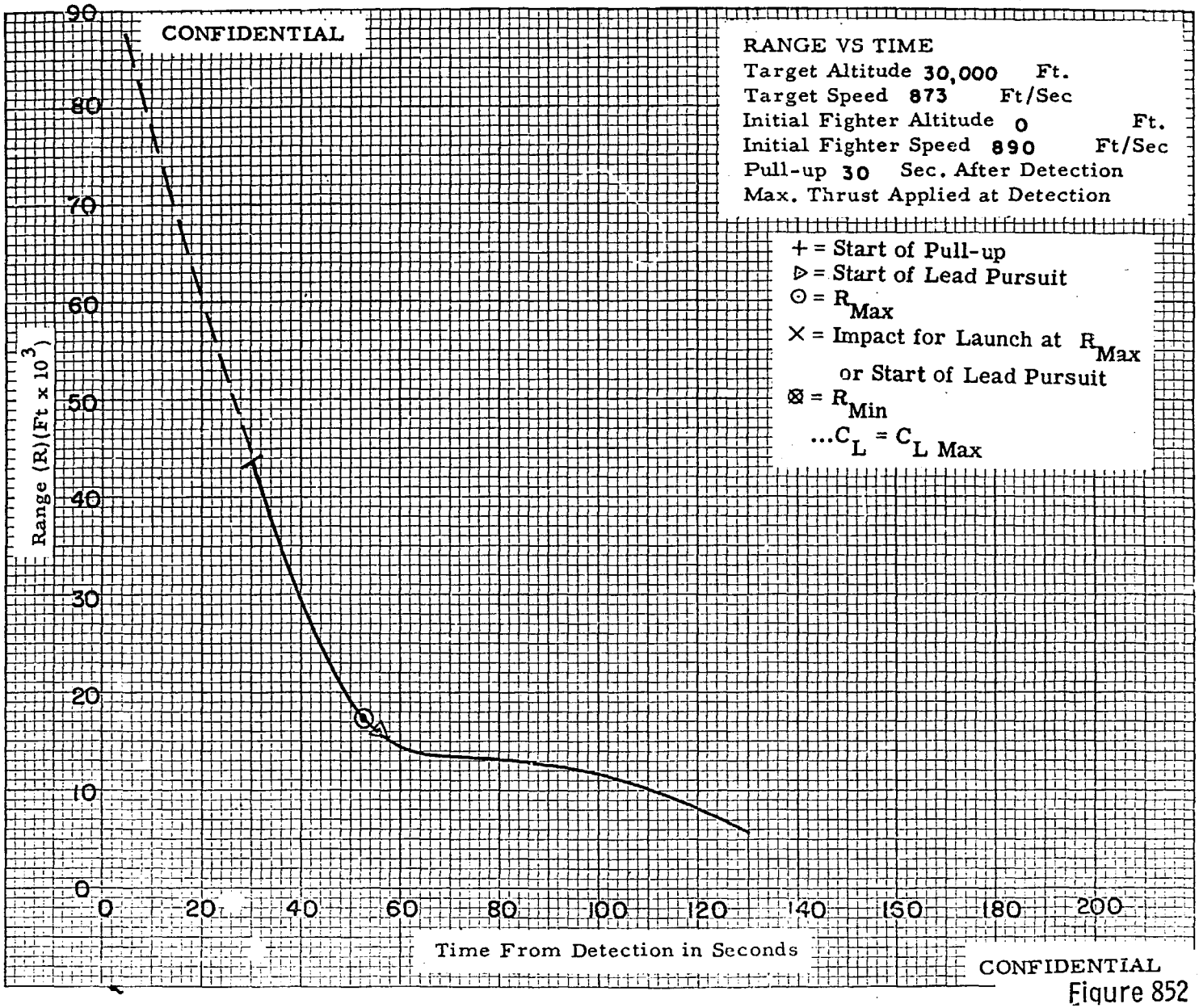
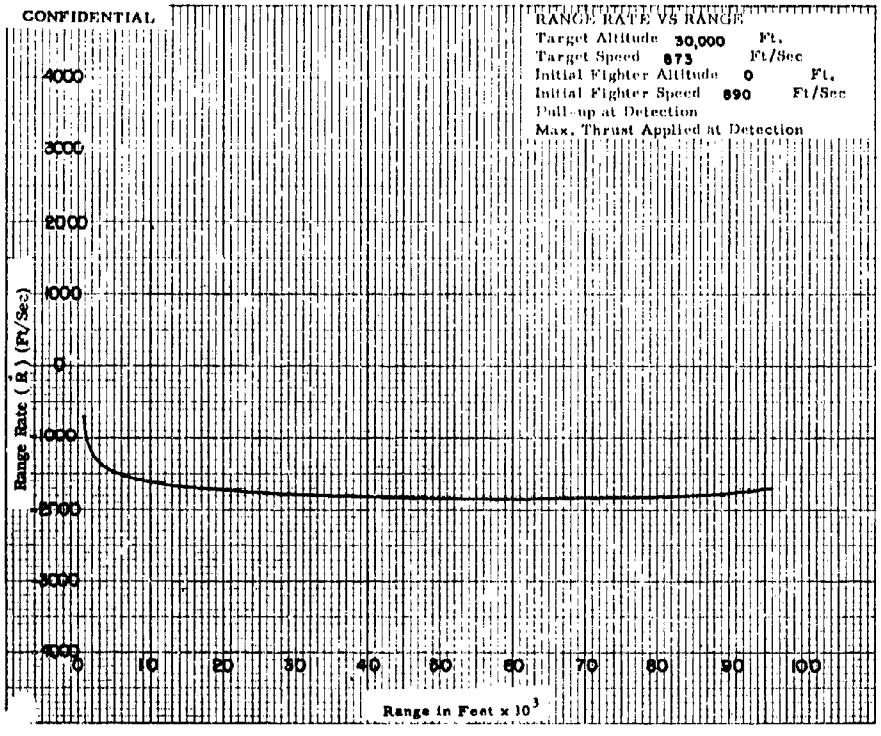
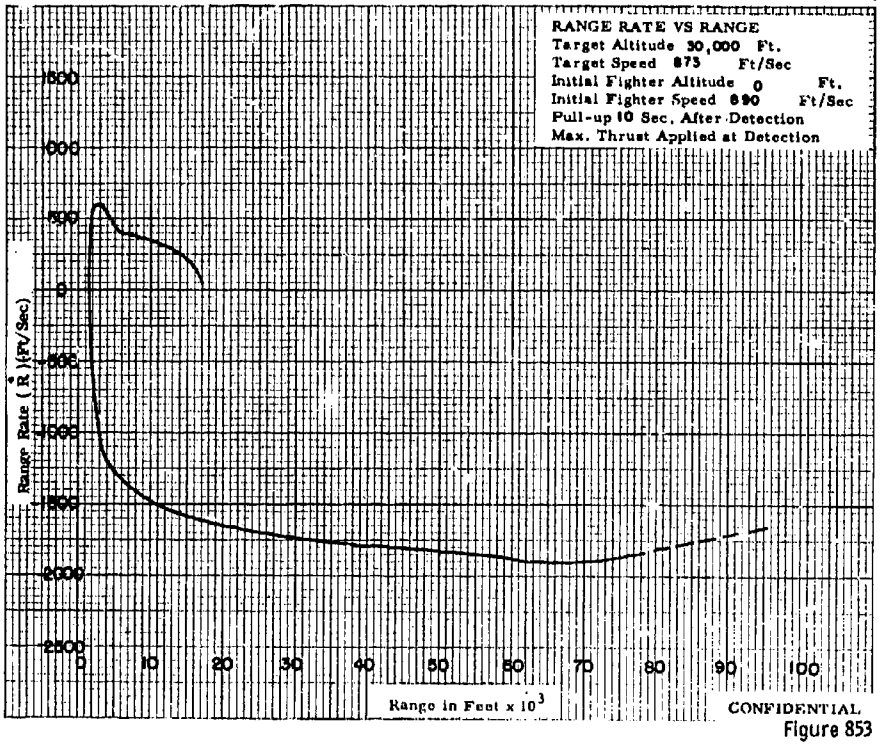

CONFIDENTIAL
RANGE VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
+ = Start of Pull-up
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
150
180
200
Time From Detection in Seconds
CONFIDENTIAL

Figure 852

CONFIDENTIAL

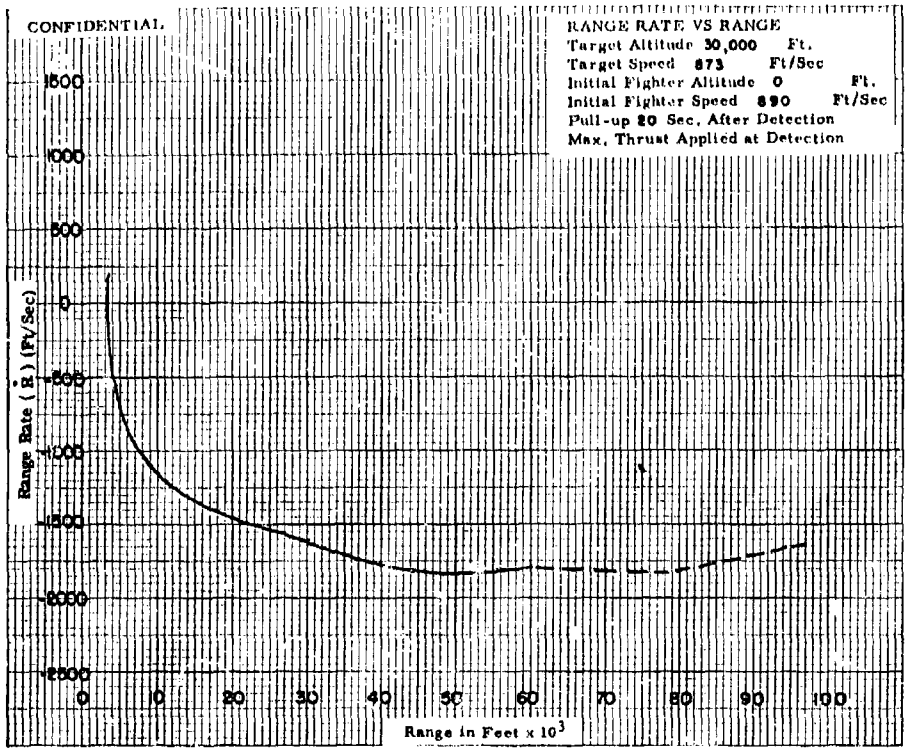


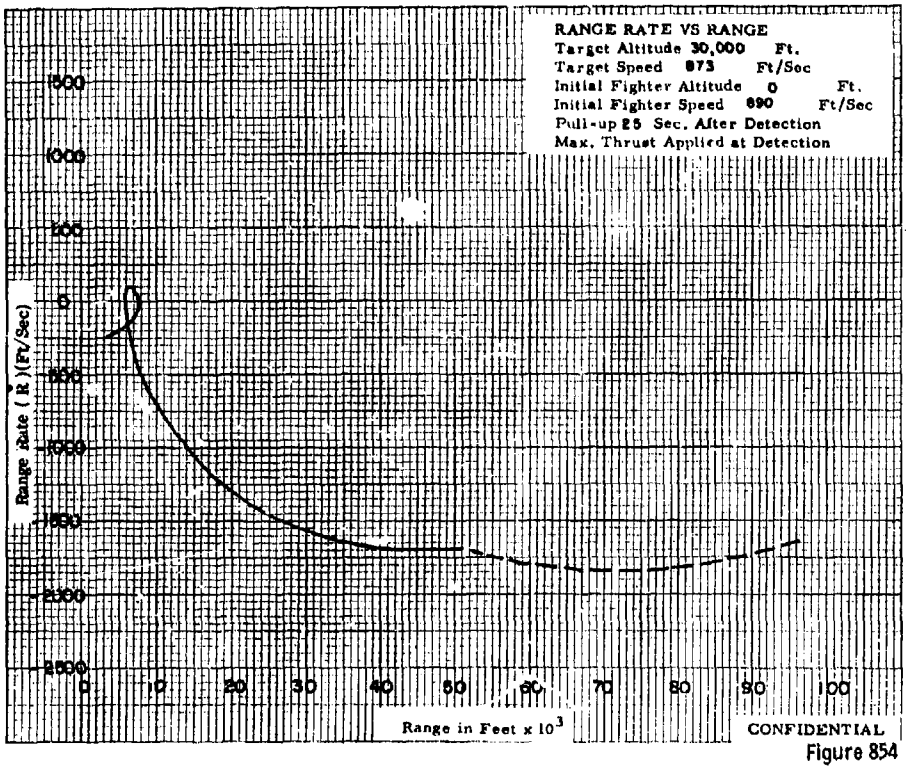


CONFIDENTIAL

Figure 853

CONFIDENTIAL





CONFIDENTIAL

Figure 854

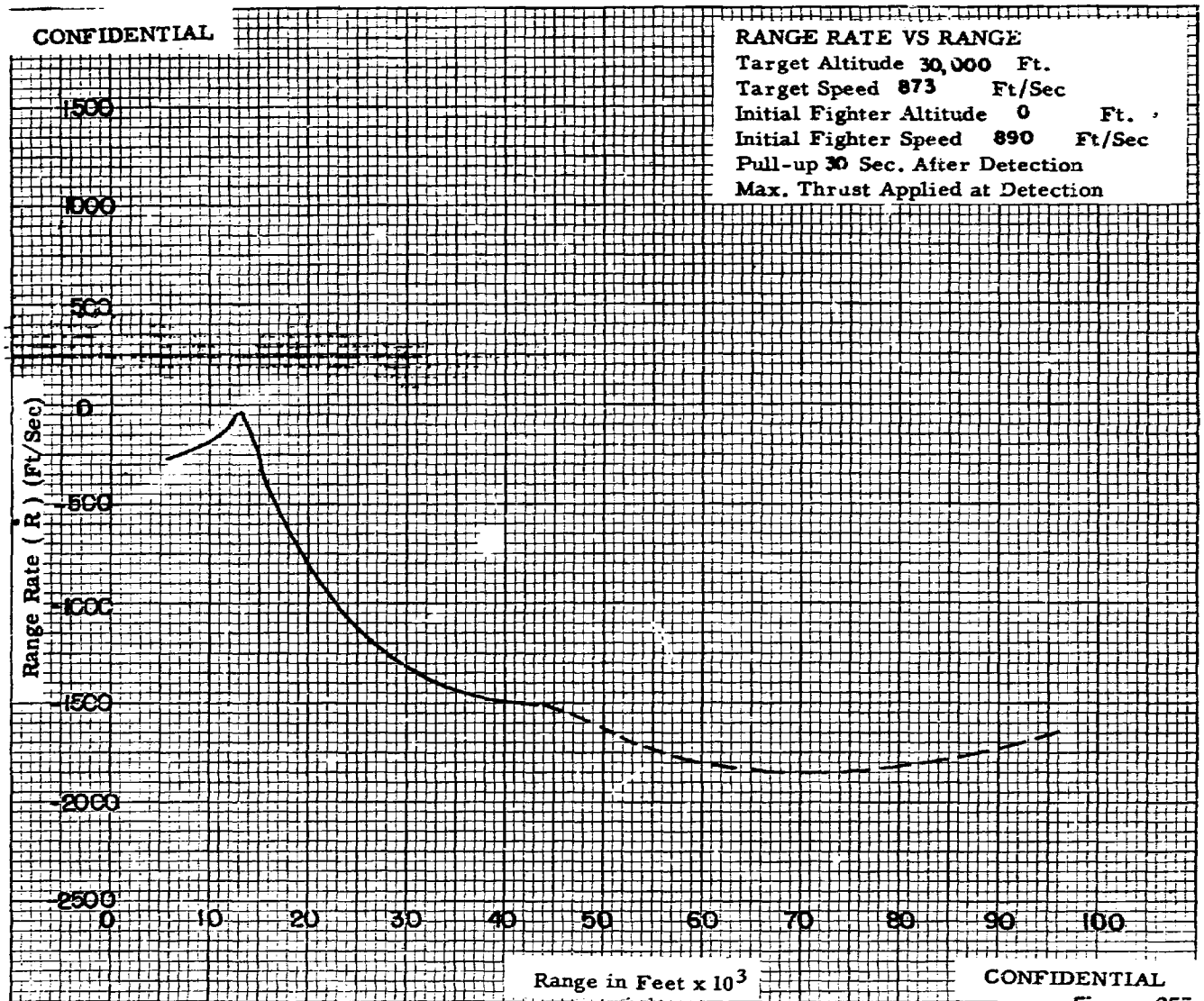
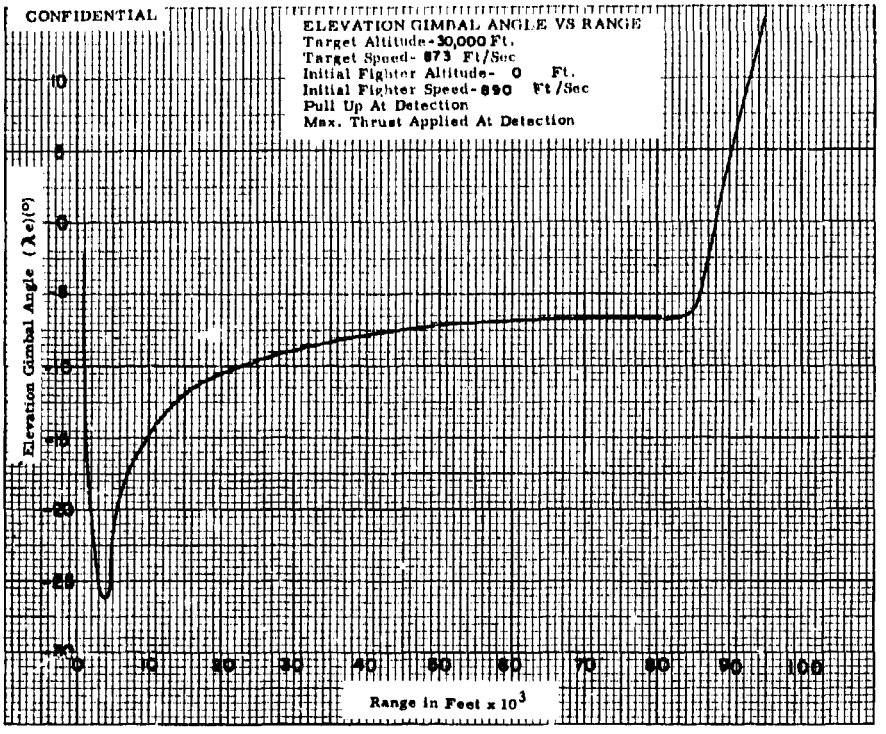
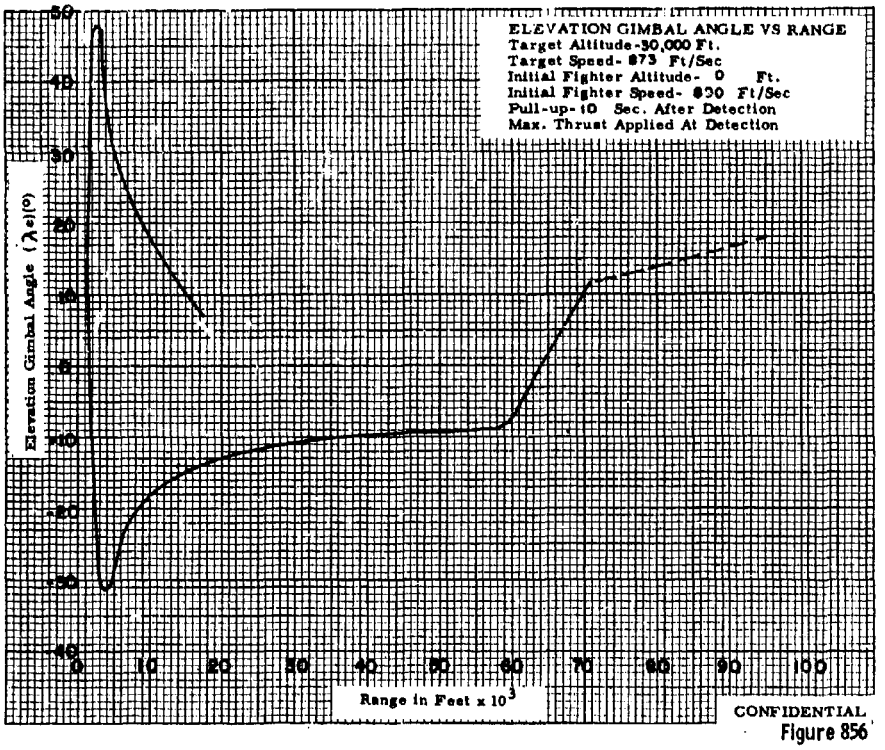

CONFIDENTIAL
RANGE RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
1500
1000
500
0
-500
-1000
-1500
-2000
-2500
Range Rate (Ṙ) (Ft/Sec)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Figure 855

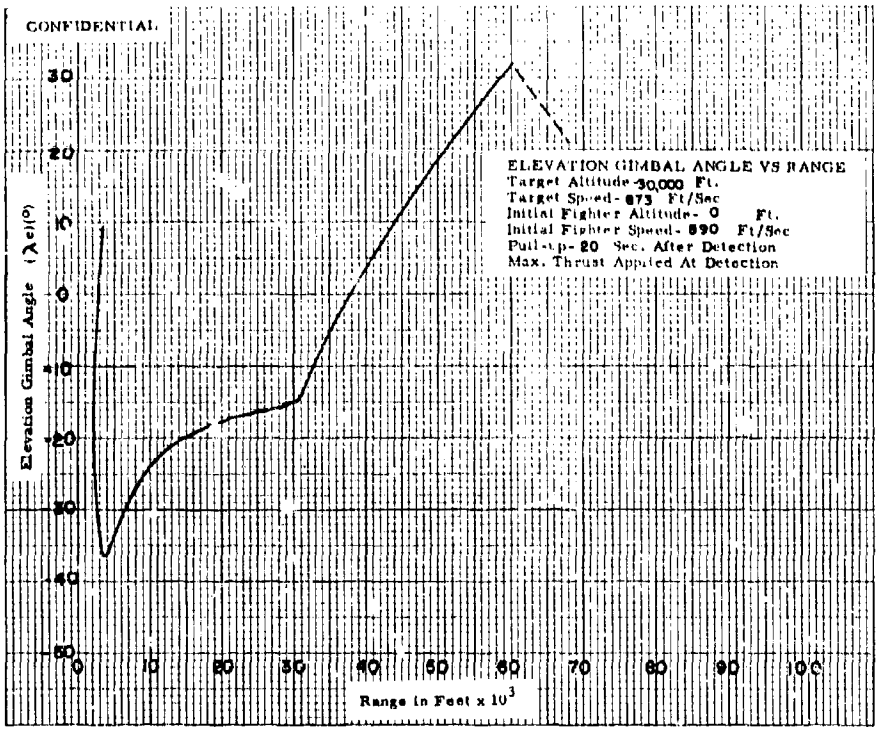
CONFIDENTIAL





CONFIDENTIAL

Figure 856


ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 0 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up- 20 Sec. After Detection
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
30
20
10
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

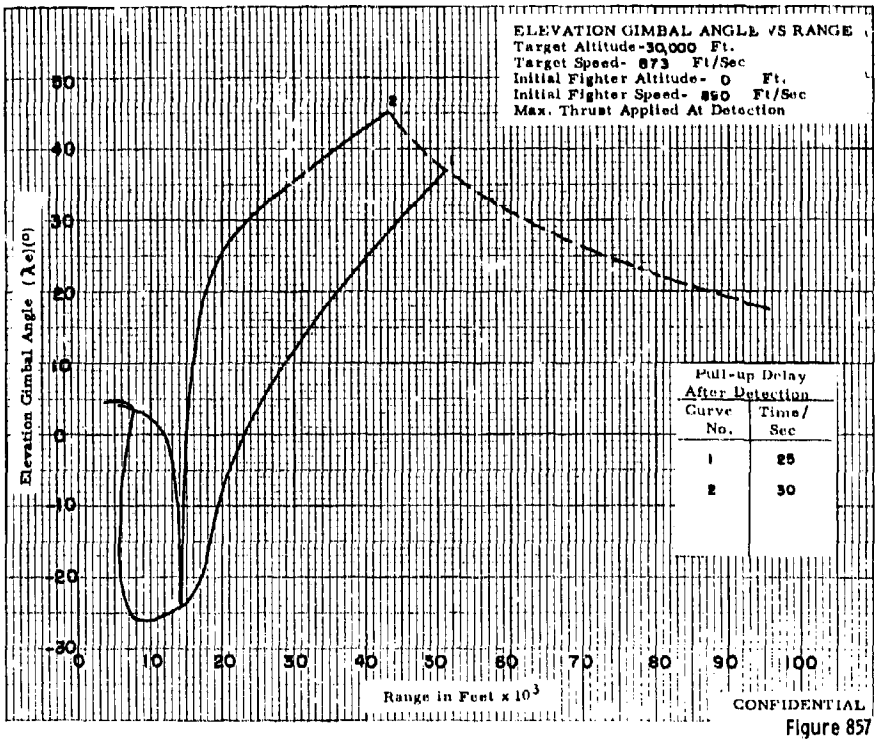
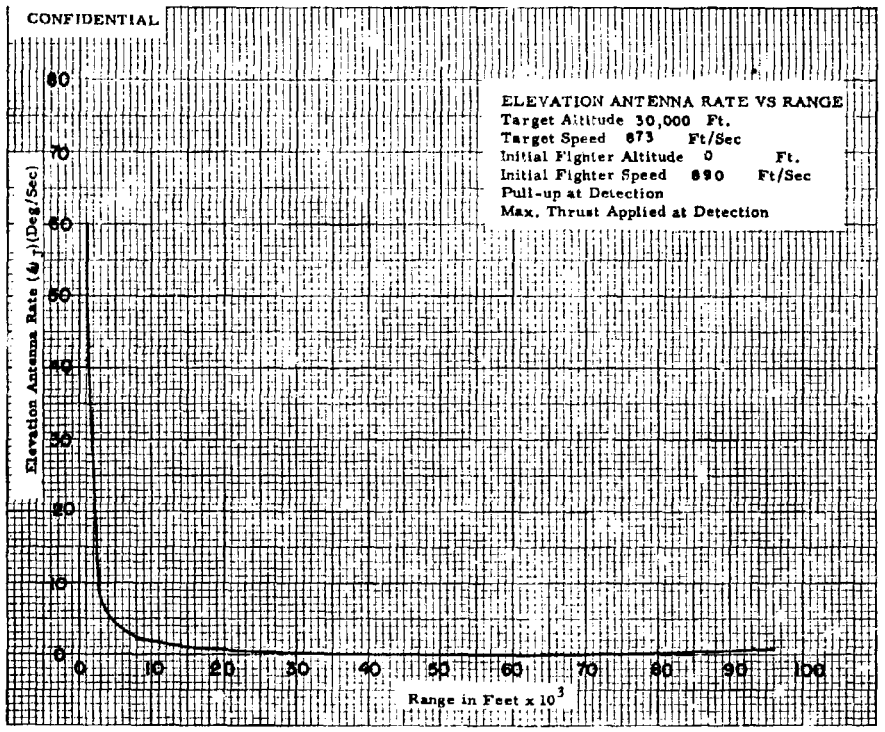
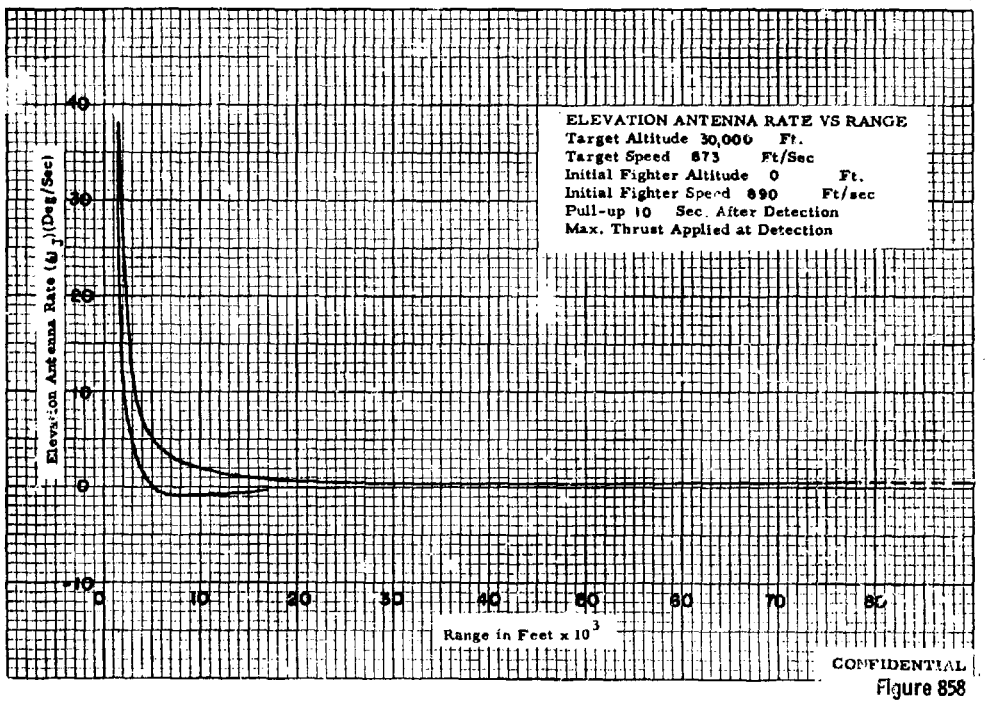

ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 0 Ft.
Initial Fighter Speed- 890 Ft/Sec
Max. Thrust Applied At Detection
Elevation Gimbal Angle (λe)(°)
50
40
30
20
10
0
-10
-20
-30
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 25
2 | 30

Figure 857

CONFIDENTIAL

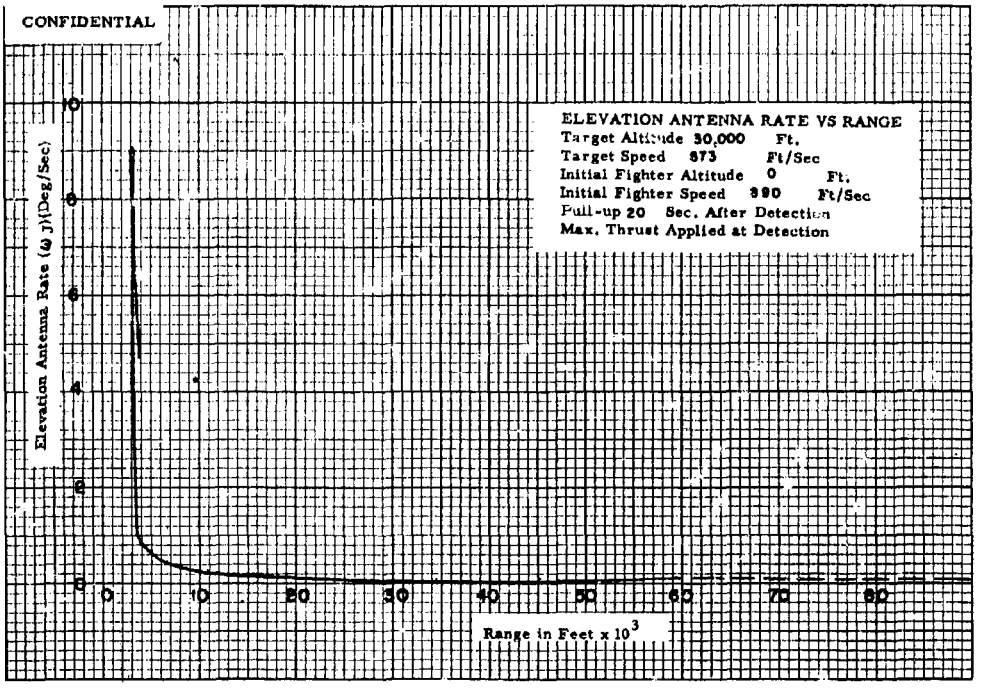


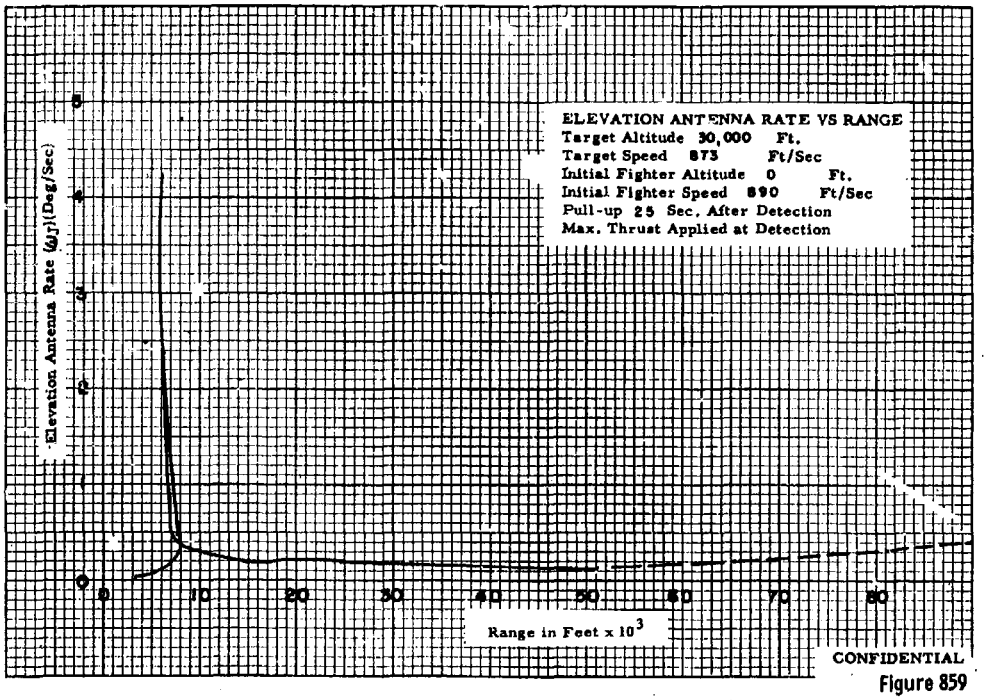


CONFIDENTIAL

Figure 858

CONFIDENTIAL





CONFIDENTIAL

Figure 859

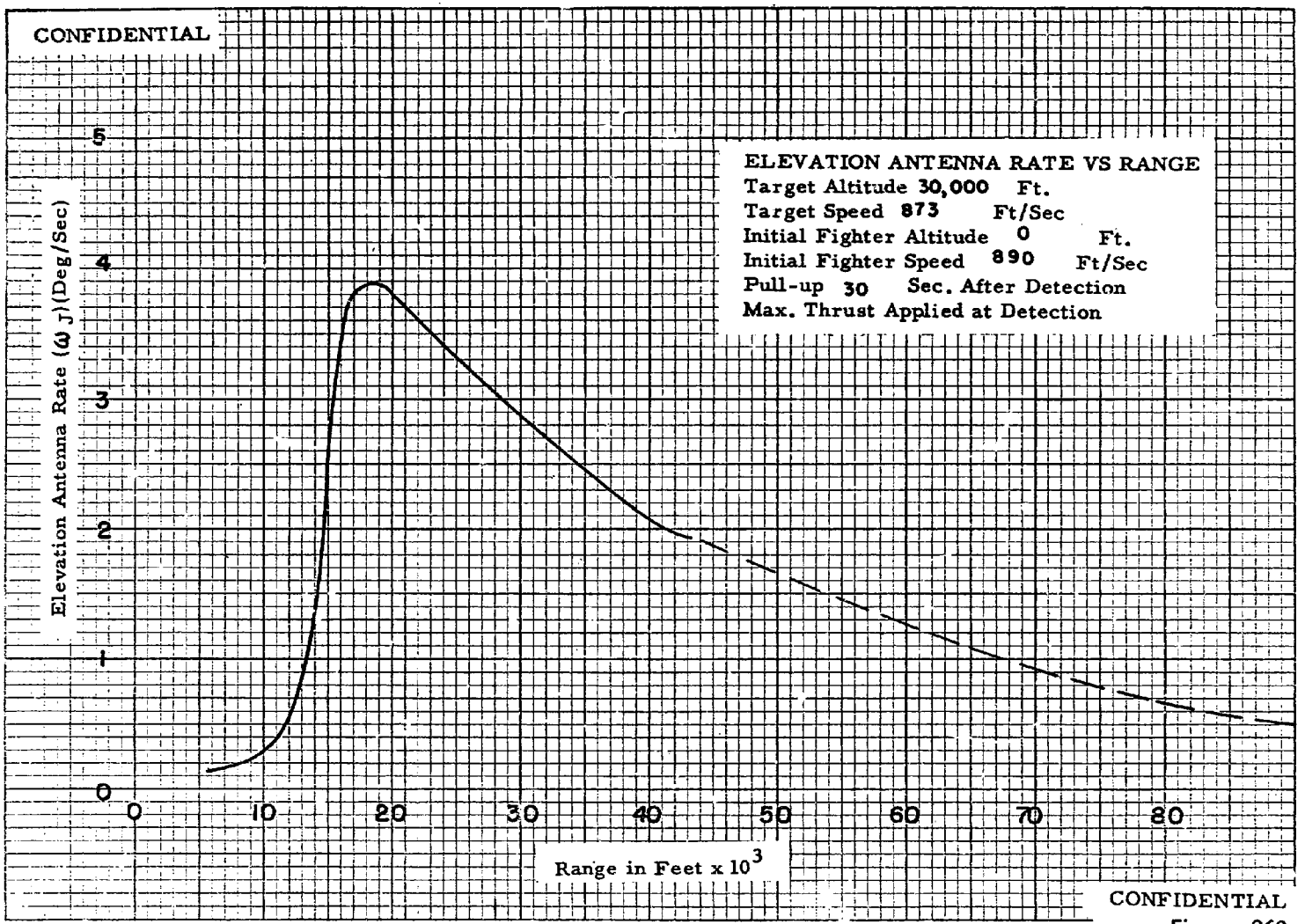
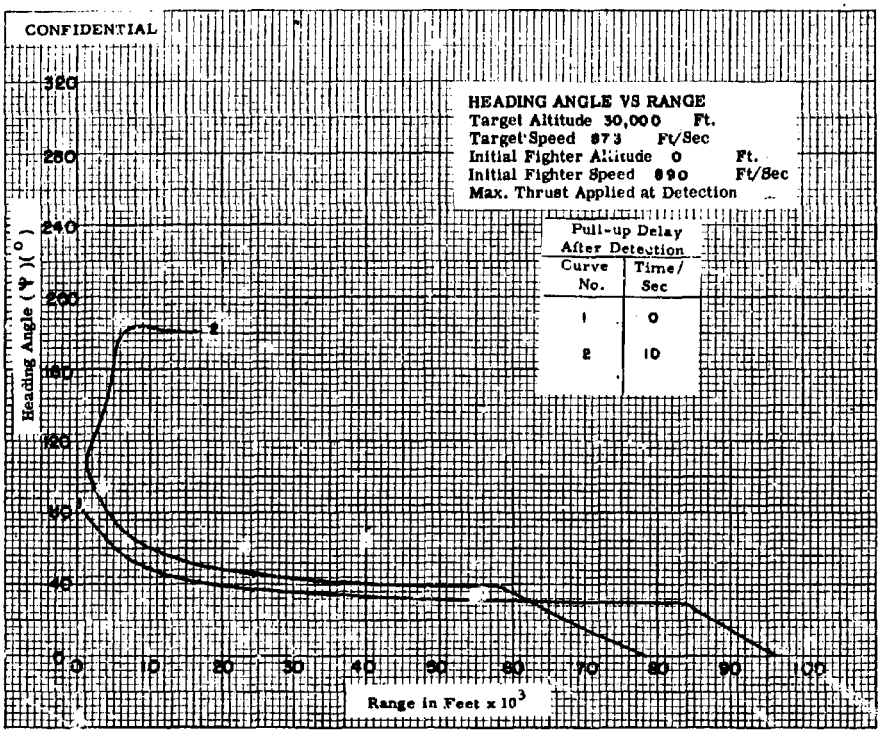

ELEVATION ANTENNA RATE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Elevation Antenna Rate (ω J)(Deg/Sec)
0
1
2
3
4
5
0
10
20
30
40
50
60
70
80
Range in Feet x 10^3

Figure 860


HEADING ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 0
2 | 10
Heading Angle (Ψ)(°)
Range in Feet x 10³

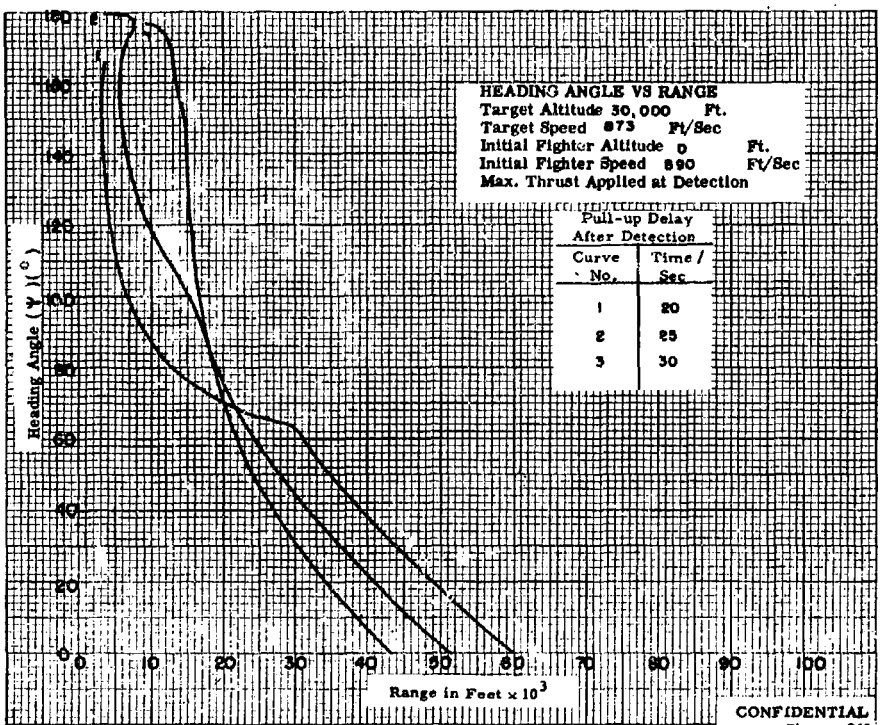
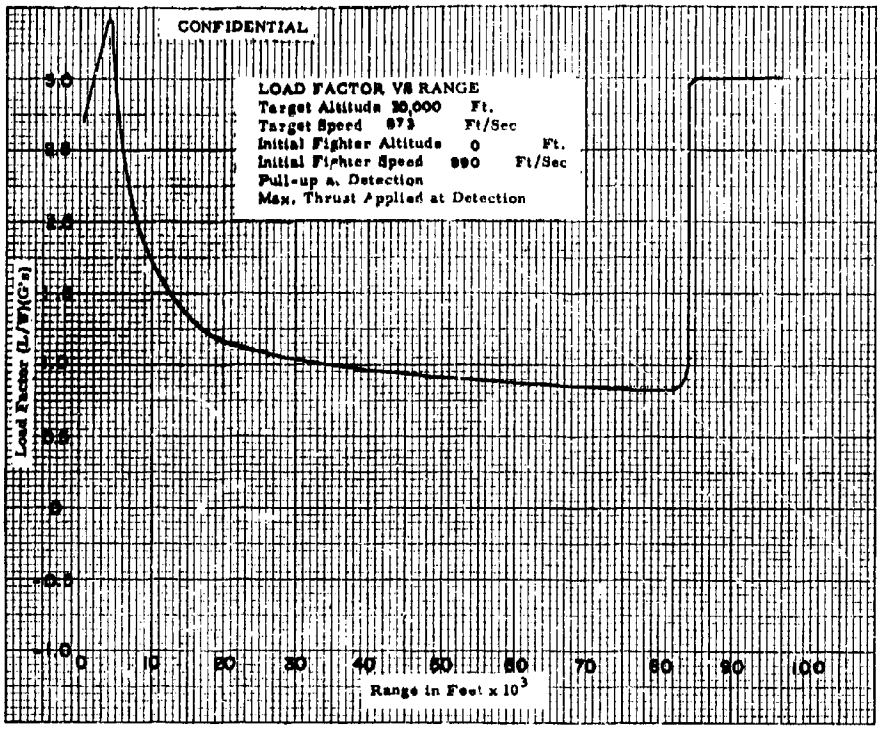

HEADING ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Max. Thrust Applied at Detection
Pull-up Delay After Detection
Curve No. | Time/Sec
1 | 20
2 | 25
3 | 30
Heading Angle (Ψ)(°)
Range in Feet x 10³

Figure 861


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90 100

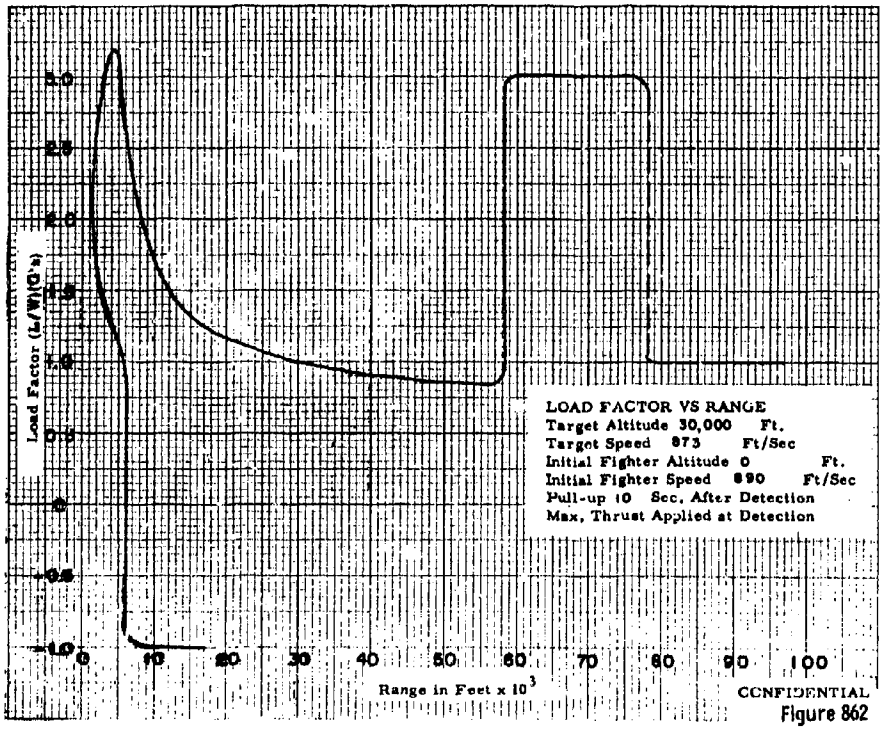
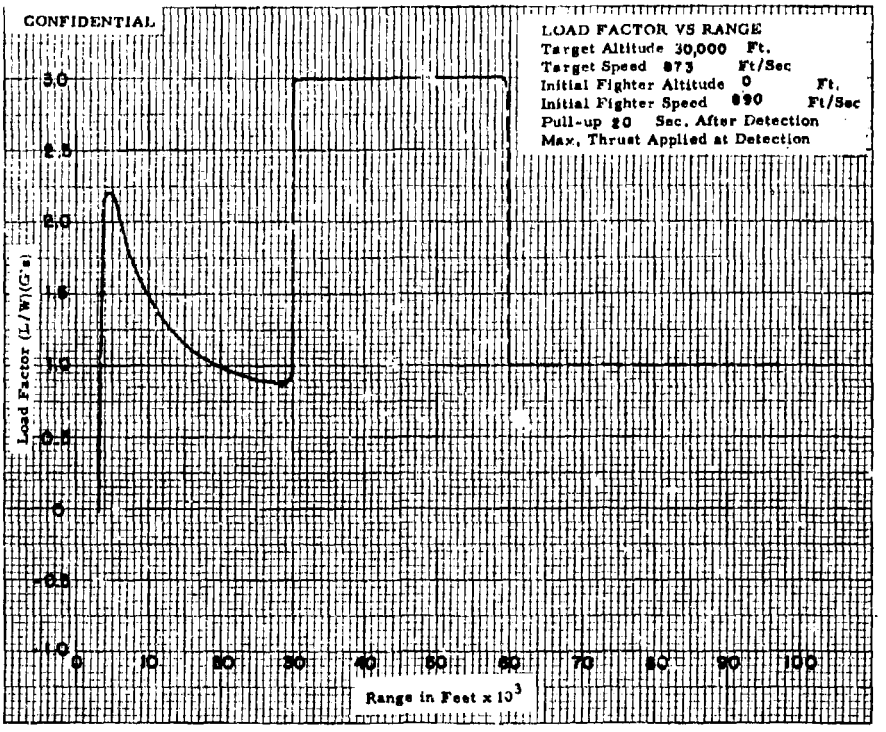

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
Range in Feet x 10^3
0 10 20 30 40 50 60 70 80 90 100
CONFIDENTIAL

Figure 862


LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

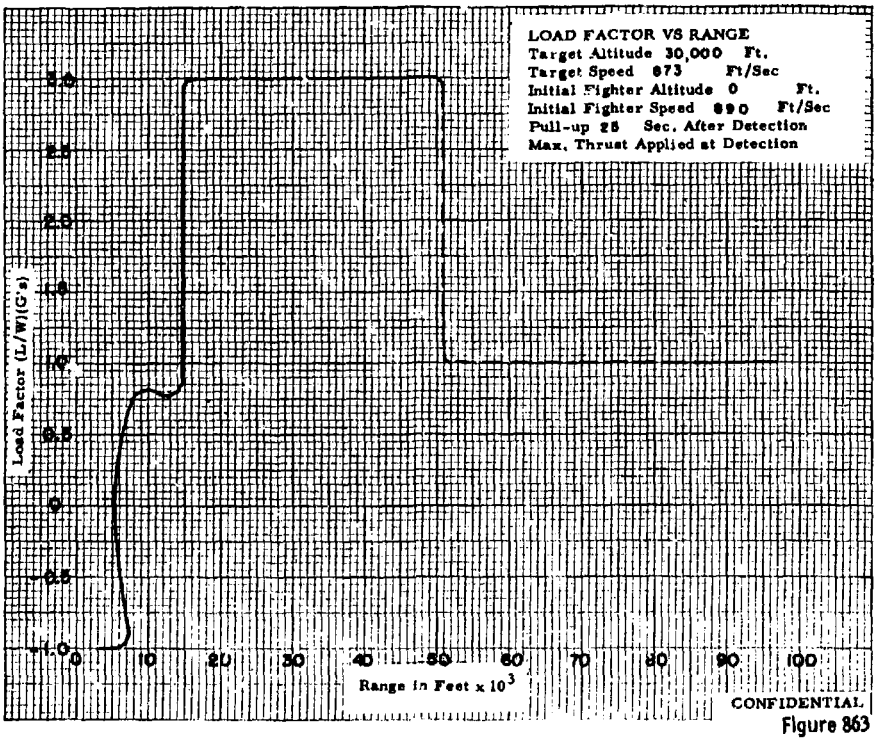

LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 863

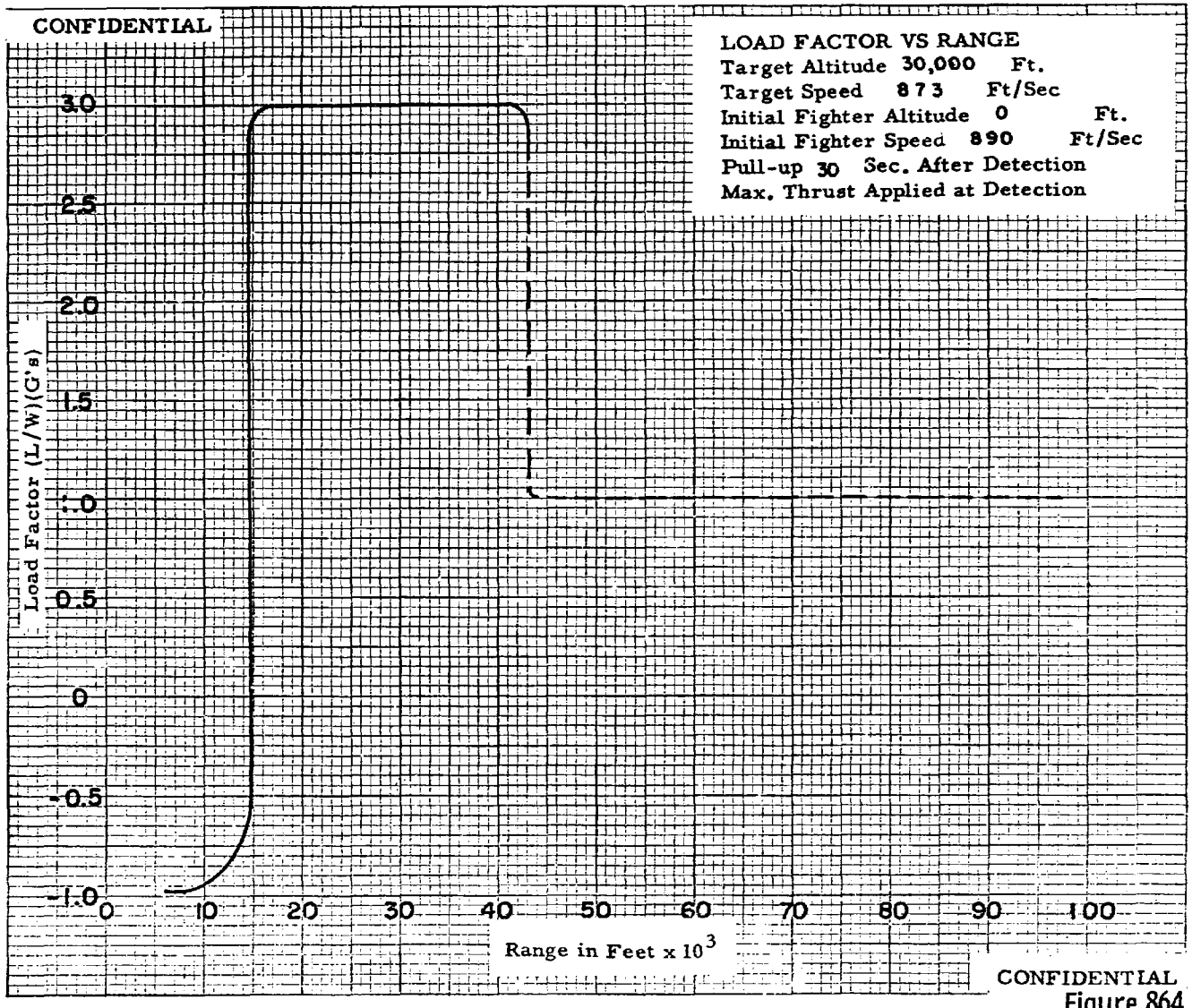
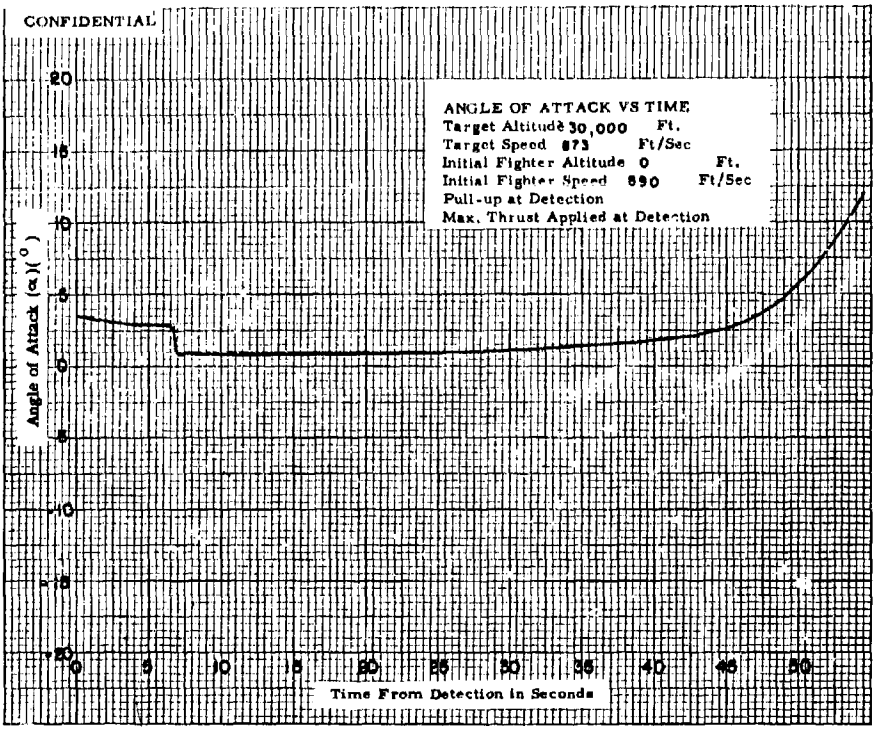

CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Load Factor (L/W)(G's)
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 864


ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Angle of Attack (α)(°)
20
15
10
5
0
-5
-10
-15
-20
0
5
10
15
20
25
30
35
40
45
50
Time From Detection in Seconds

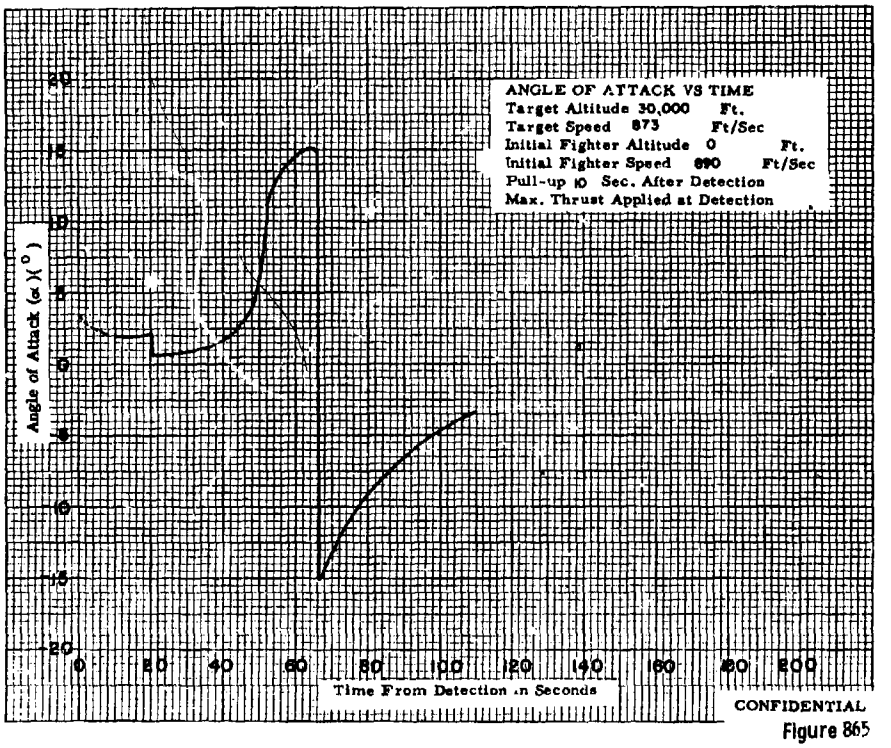
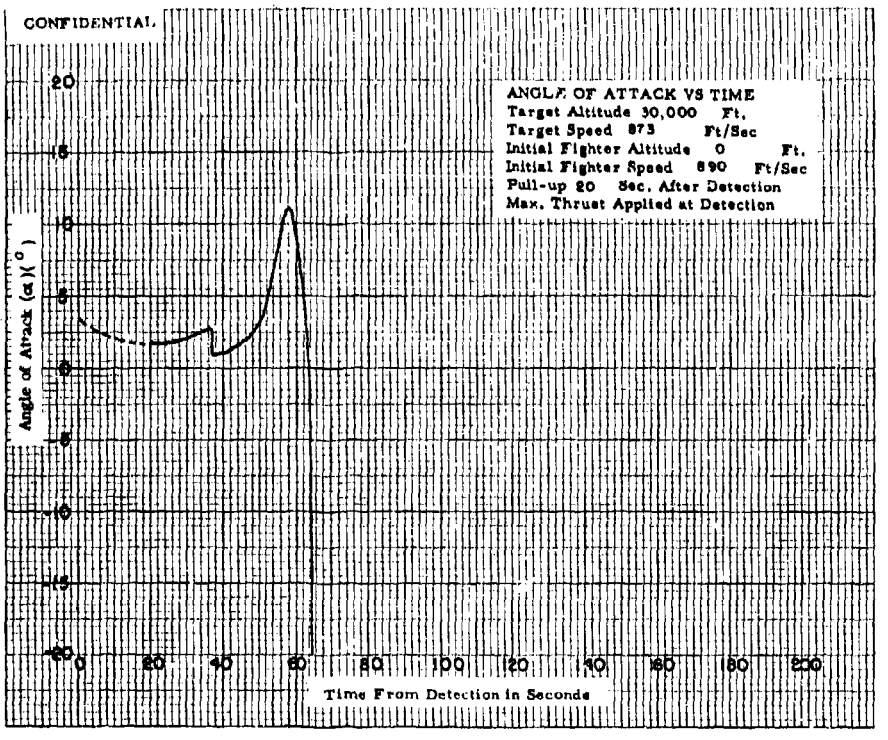

ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Angle of Attack (α)(°)
20
15
10
5
0
-5
-10
-15
-20
0
20
40
60
80
100
120
140
160
180
200
Time From Detection in Seconds

Figure 865


ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Angle of Attack (α)(°)
20
15
10
5
0
-5
-10
-15
-20
0
20
40
60
80
100
120
140
160
180
200
Time From Detection in Seconds

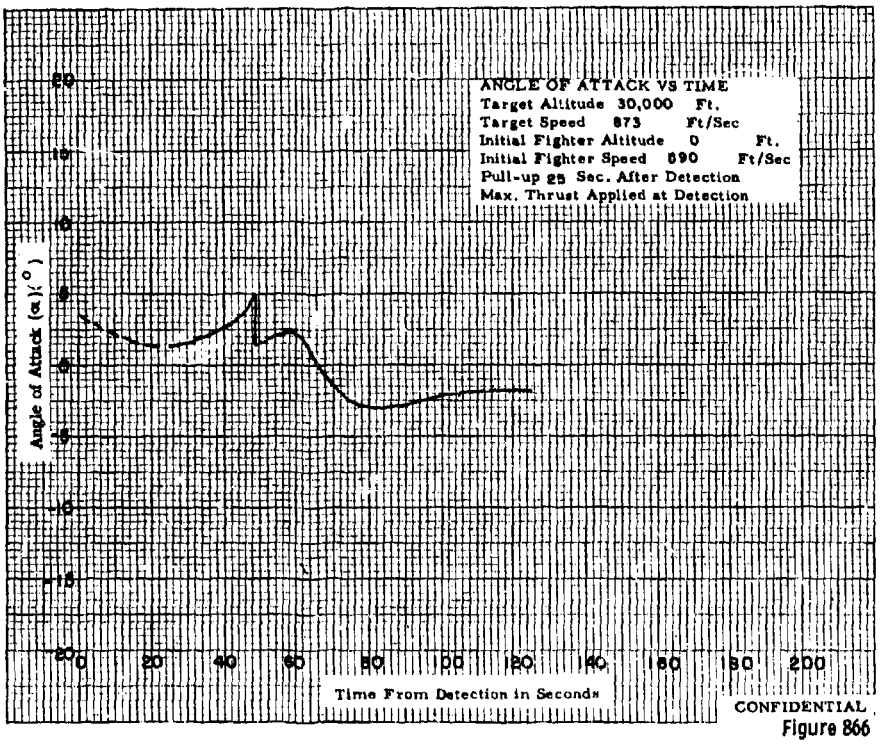

ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Angle of Attack (α)(°)
20
15
10
5
0
-5
-10
-15
-20
0
20
40
60
80
100
120
140
160
180
200
Time From Detection in Seconds

Figure 866

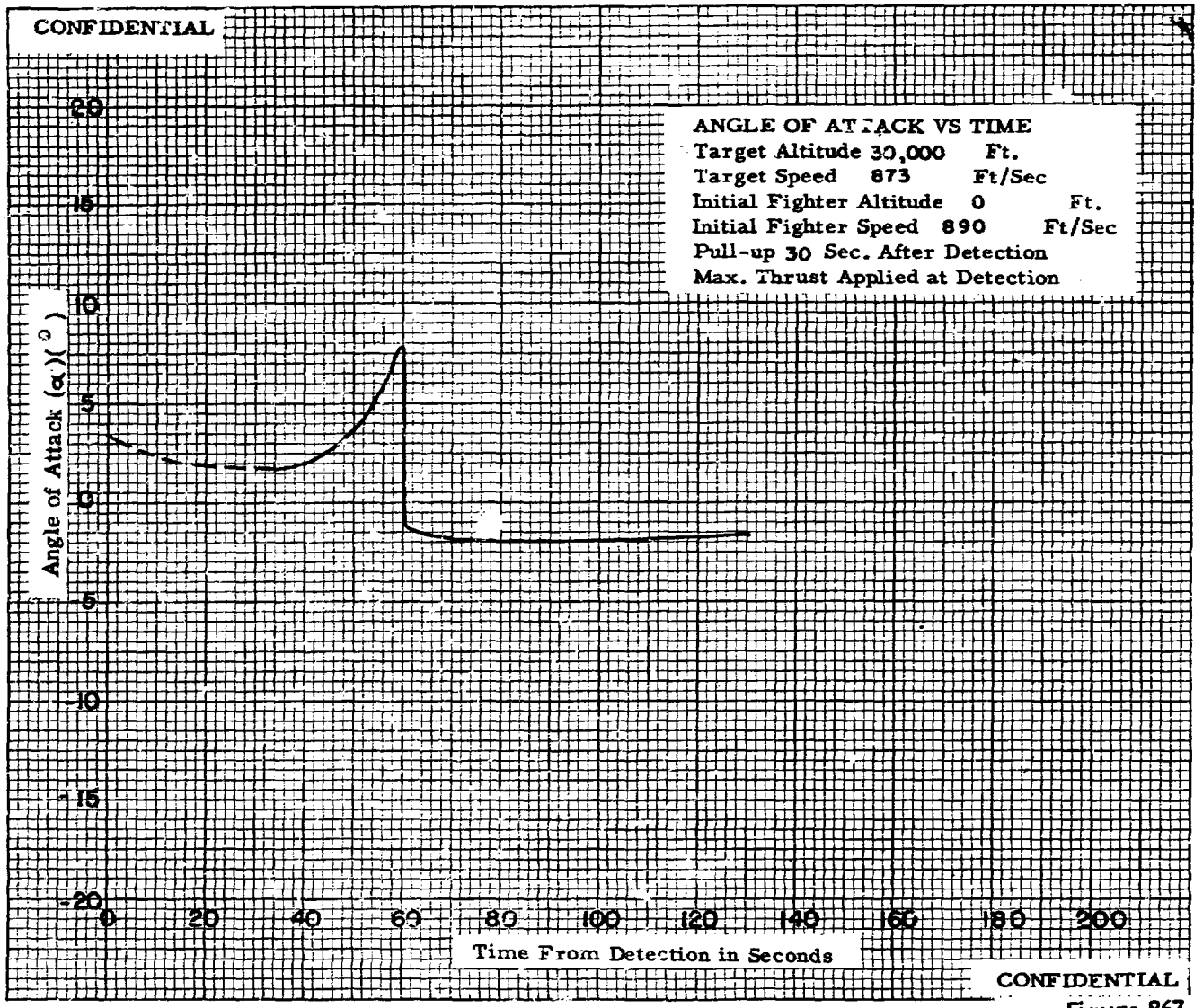
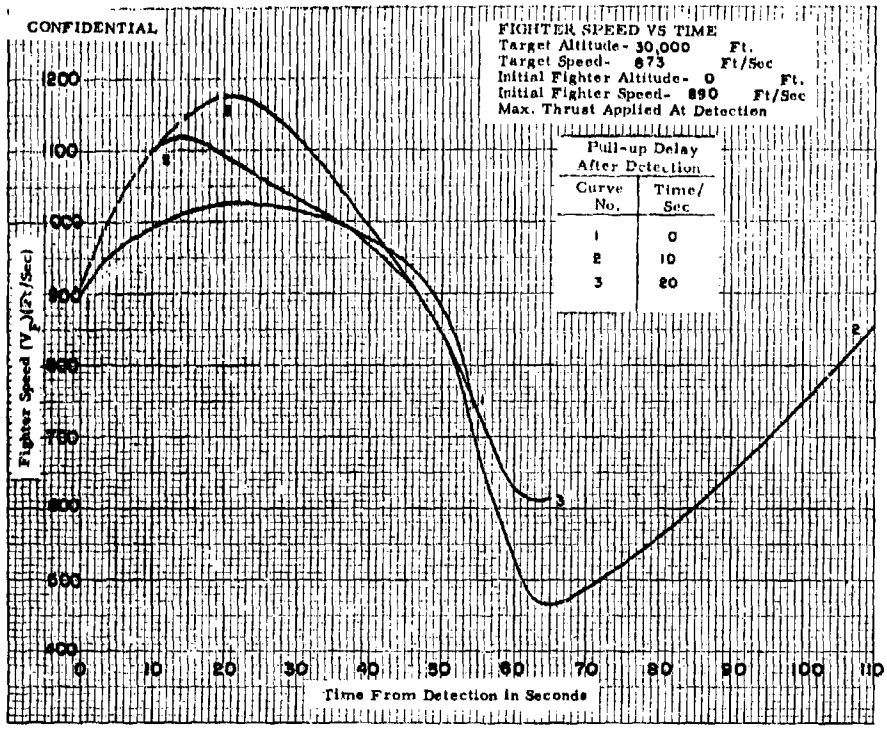

ANGLE OF ATTACK VS TIME
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Angle of Attack (α)(°)
20
15
10
5
0
-5
-10
-15
-20
0
20
40
60
80
100
120
140
160
180
200
Time From Detection in Seconds

Figure 867


FIGHTER SPEED VS TIME
Target Altitude- 30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 0 Ft.
Initial Fighter Speed- 890 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 0
2 | 10
3 | 20
Fighter Speed (V_F)(Ft/Sec)
1200
1100
1000
900
800
700
600
500
400
0 10 20 30 40 50 60 70 80 90 100 110
Time From Detection in Seconds

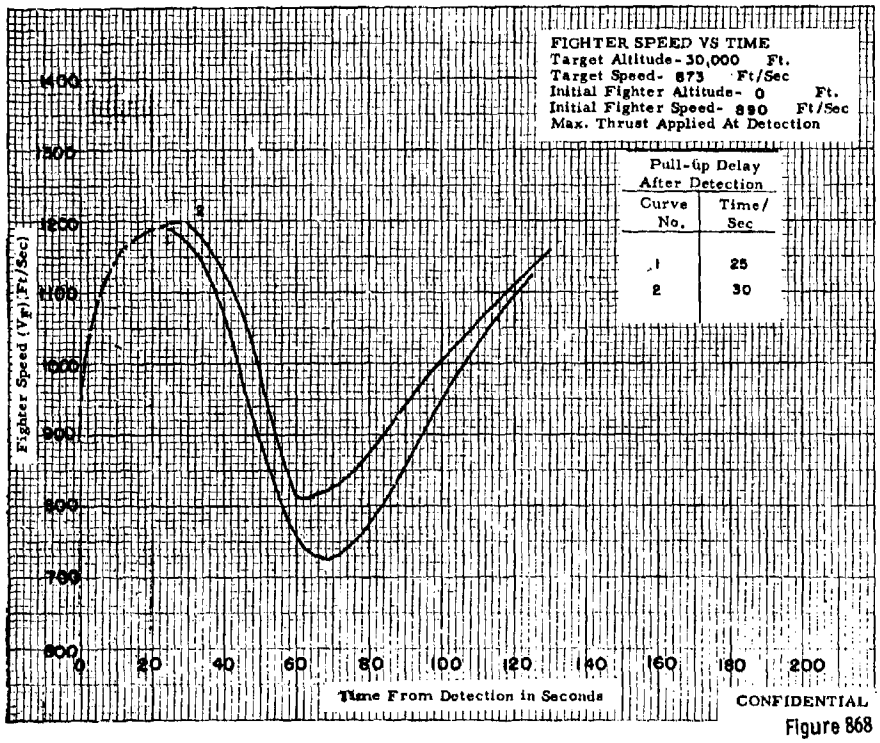
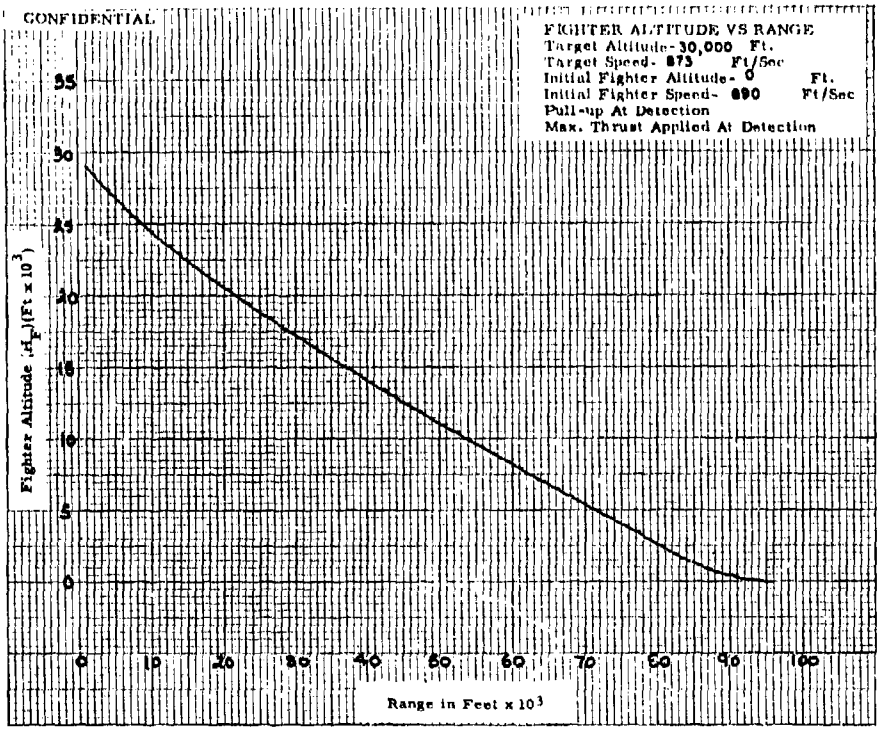
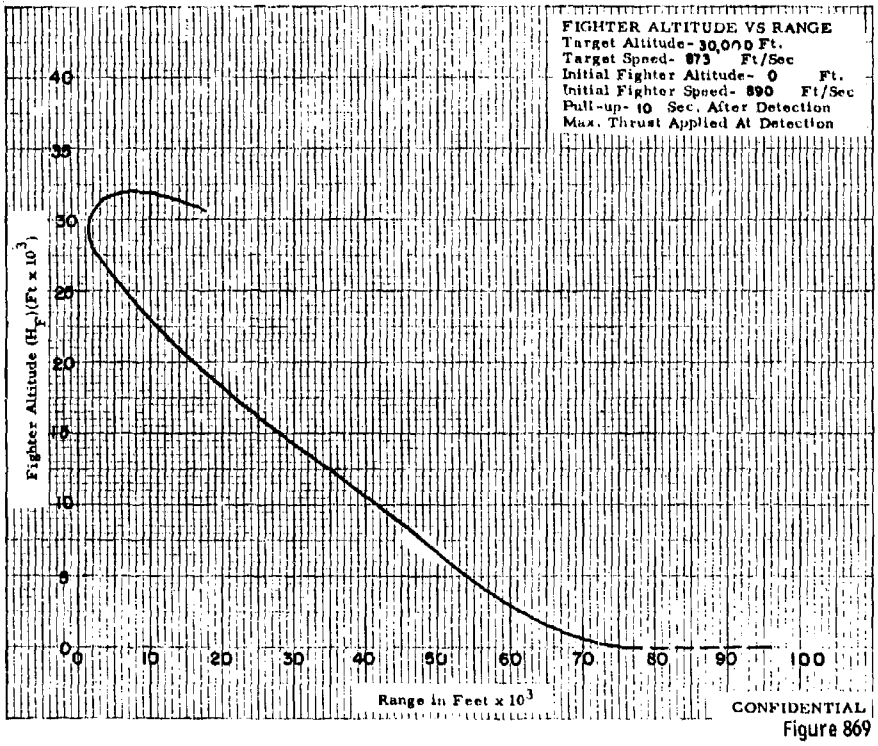

FIGHTER SPEED VS TIME
Target Altitude- 30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 0 Ft.
Initial Fighter Speed- 890 Ft/Sec
Max. Thrust Applied At Detection
Pull-up Delay After Detection
Curve No. | Time/ Sec
1 | 25
2 | 30
Fighter Speed (V_F) (Ft/Sec)
1400
1300
1200
1100
1000
900
800
700
600
0 20 40 60 80 100 120 140 160 180 200
Time From Detection in Seconds

Figure 868

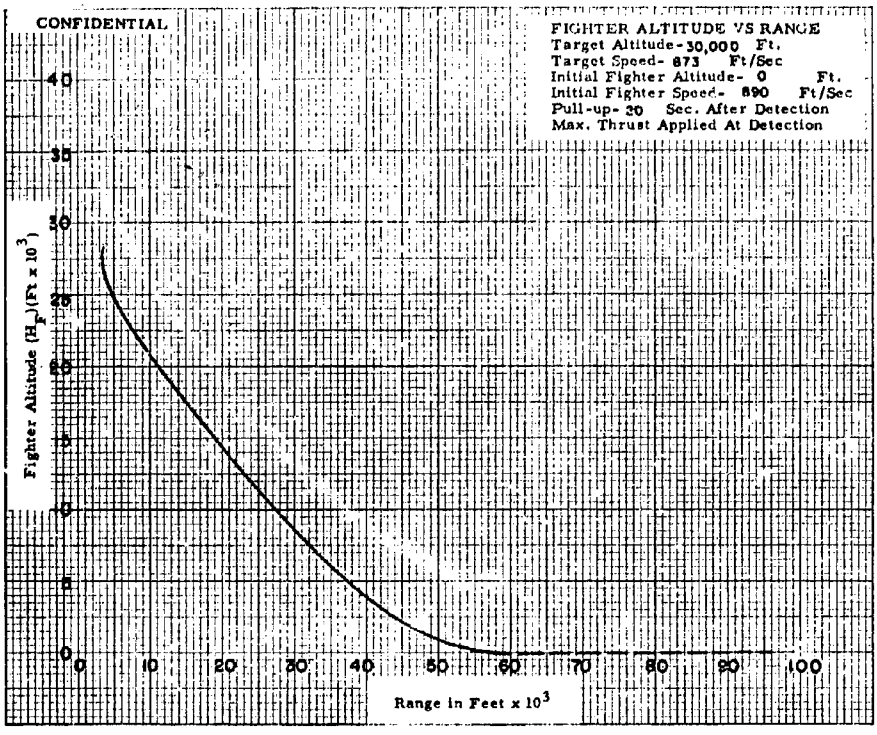
CONFIDENTIAL





CONFIDENTIAL

Figure 869


FIGHTER ALTITUDE VS RANGE
Target Altitude- 30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 0 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up- 30 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90
100

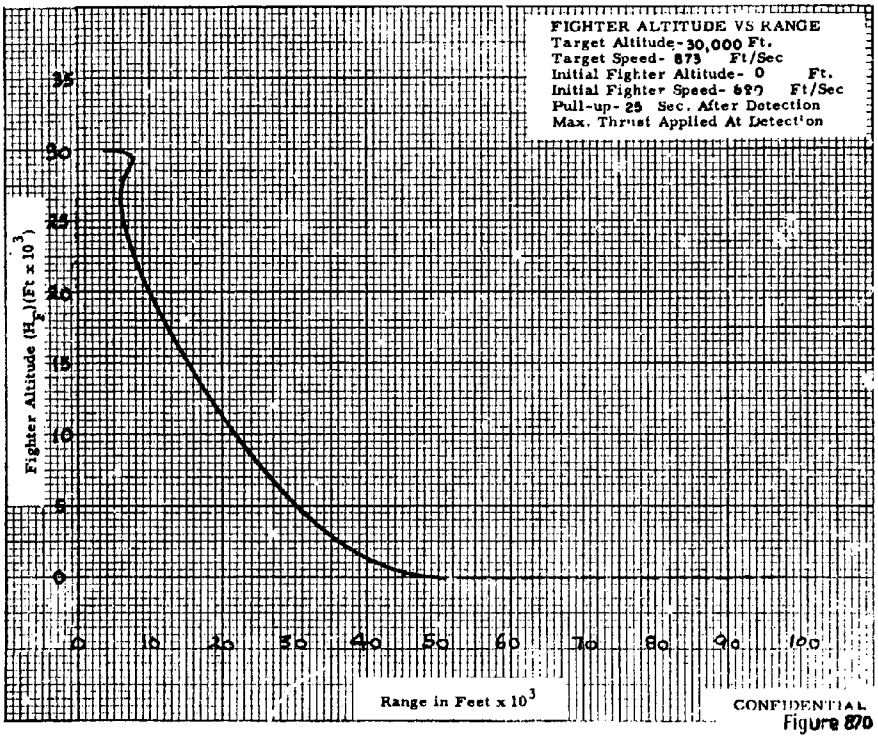

FIGHTER ALTITUDE VS RANGE
Target Altitude- 30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 0 Ft.
Initial Fighter Speed- 820 Ft/Sec
Pull-up- 25 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3
0
10
20
30
40
50
60
70
80
90
100

Figure 870

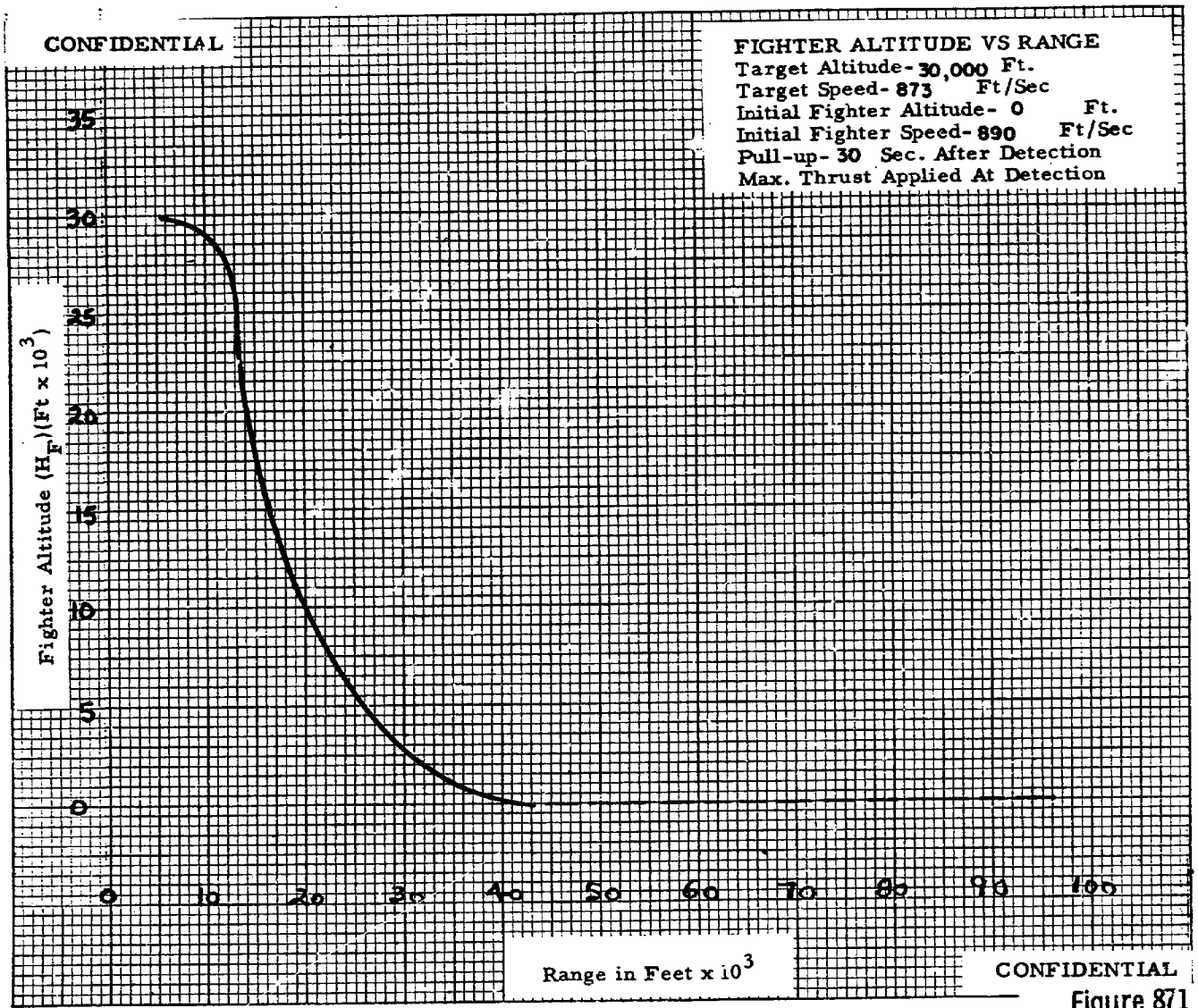
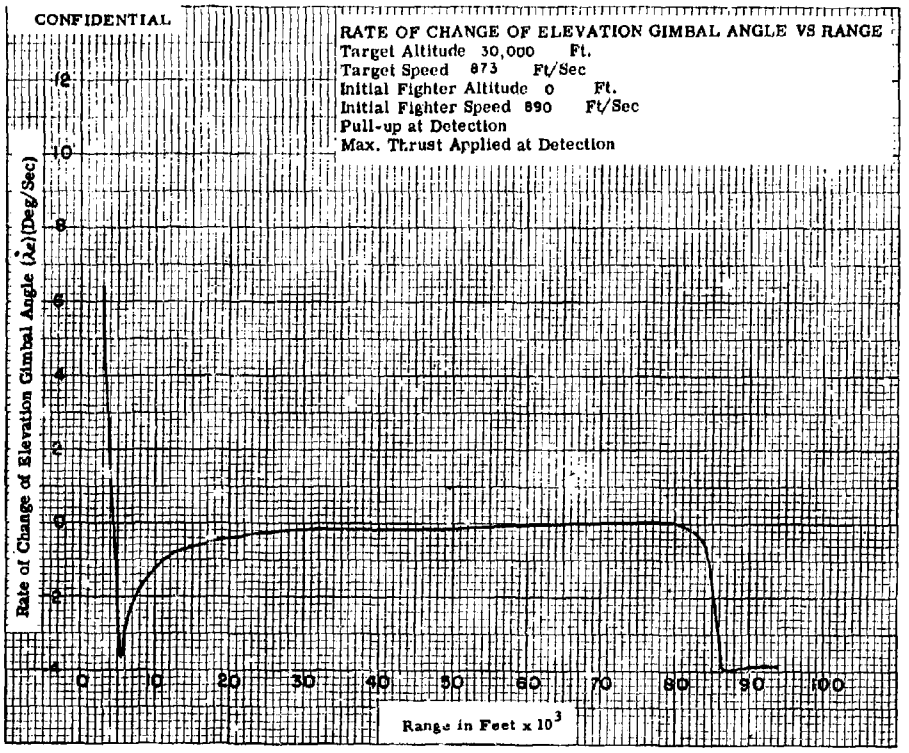
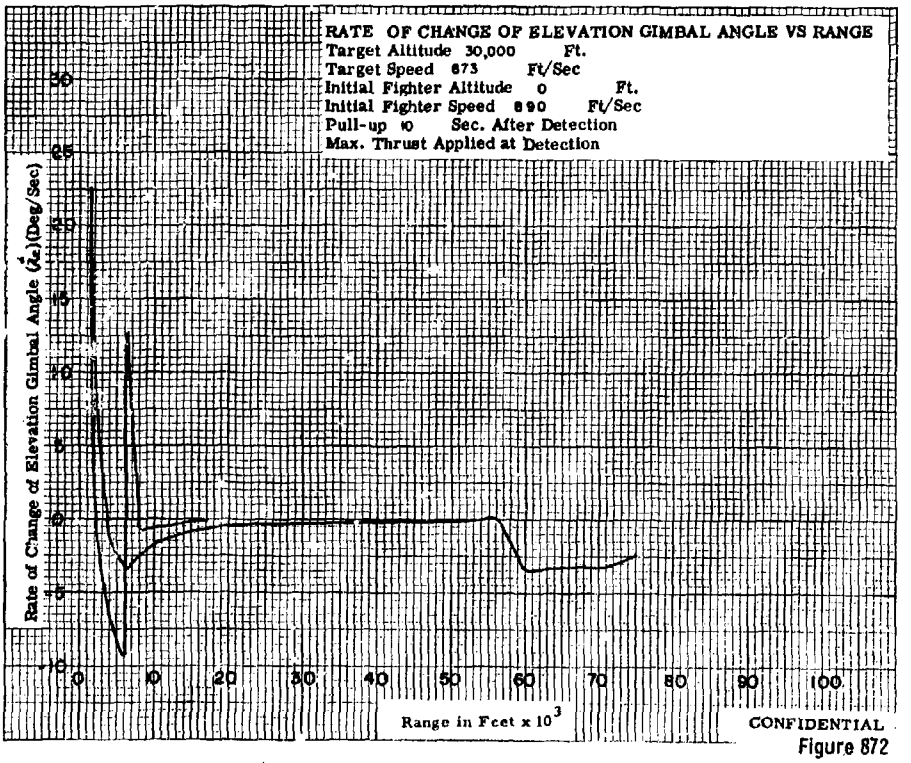

CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude- 30,000 Ft.
Target Speed- 873 Ft/Sec
Initial Fighter Altitude- 0 Ft.
Initial Fighter Speed- 890 Ft/Sec
Pull-up- 30 Sec. After Detection
Max. Thrust Applied At Detection
Fighter Altitude (H_F)(Ft x 10^3)
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 871

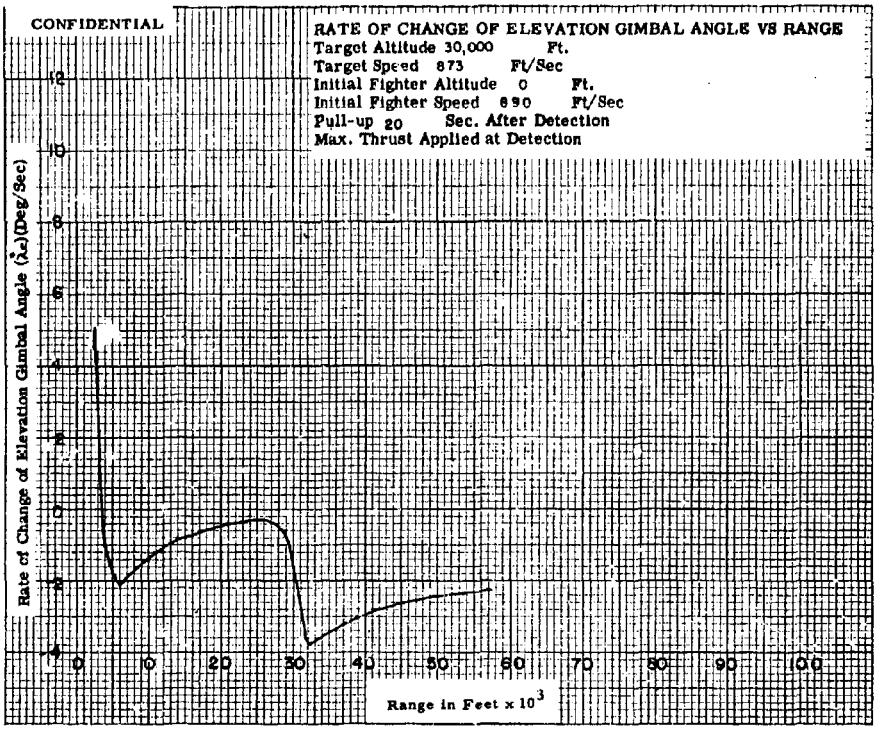
CONFIDENTIAL





CONFIDENTIAL

Figure 872


RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇ε)(Deg/Sec)
12
10
8
6
4
2
0
-2
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

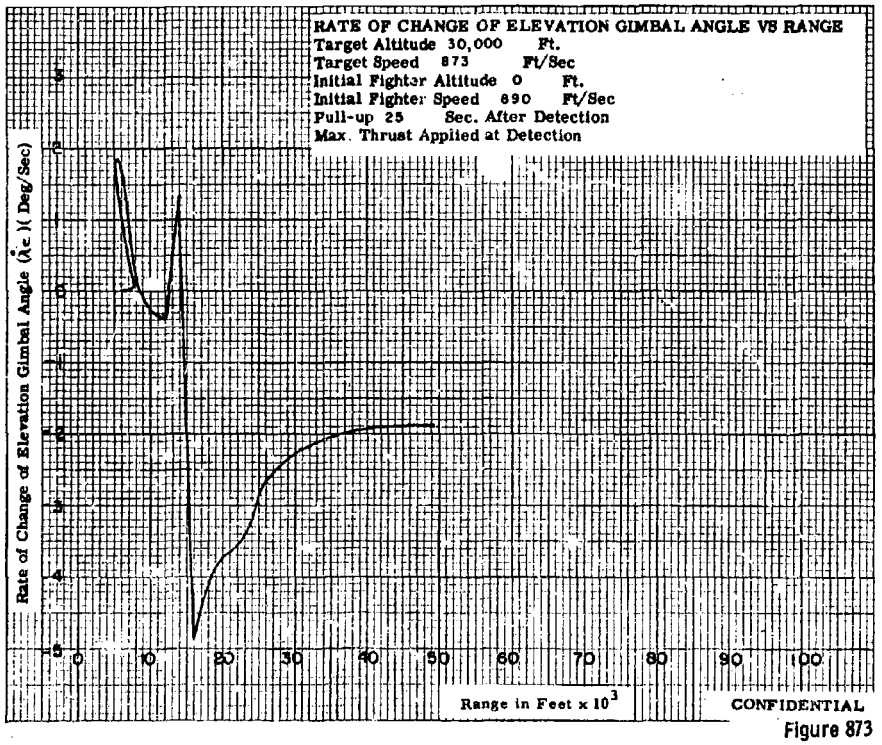

RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle (λ̇ε)(Deg/Sec)
3
2
1
0
-1
-2
-3
-4
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3

Figure 873

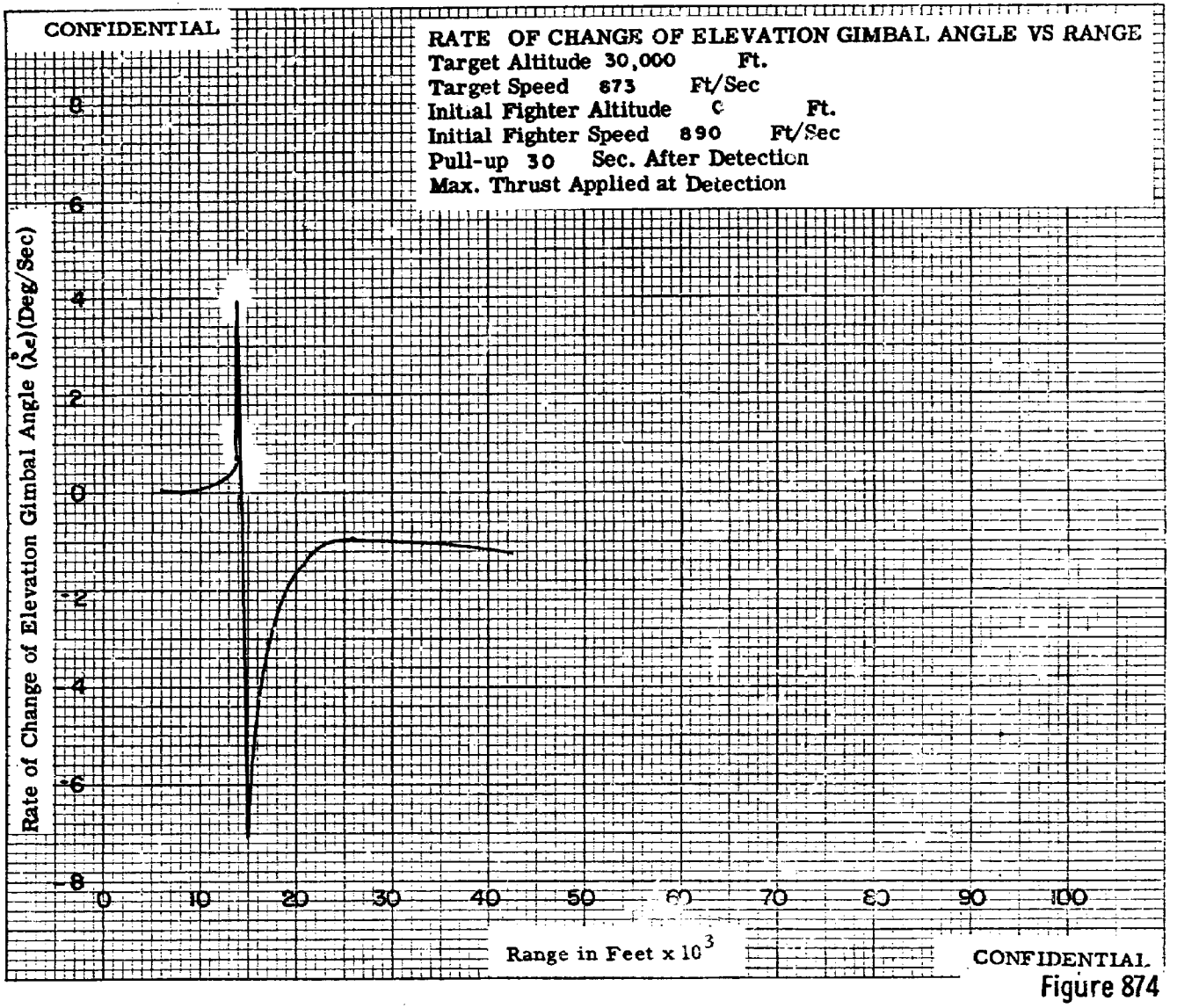
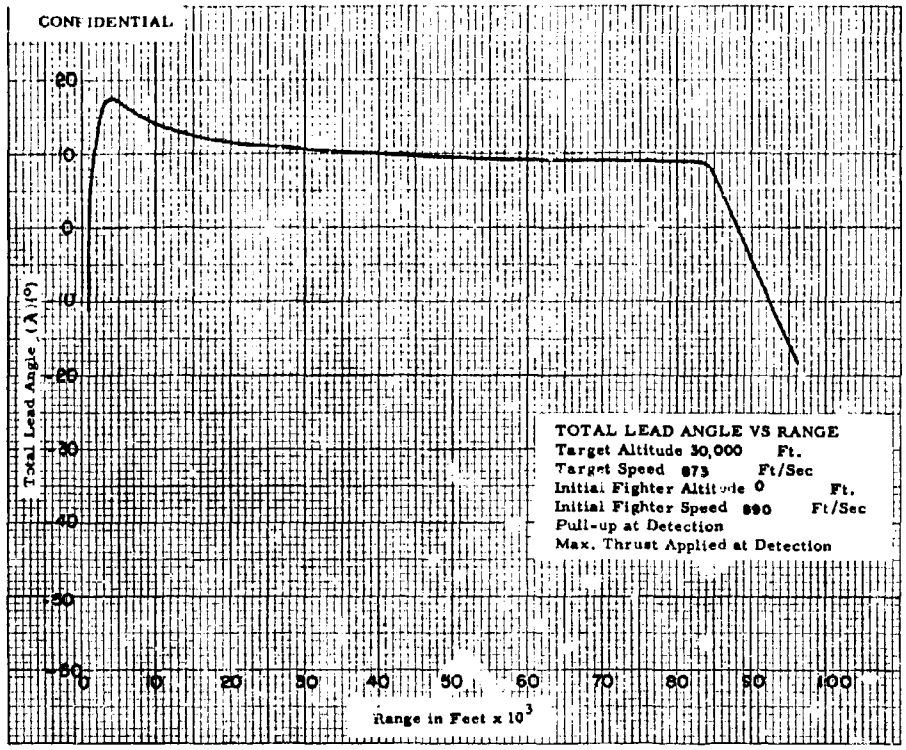

CONFIDENTIAL
RATE OF CHANGE OF ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Elevation Gimbal Angle ($\dot{\lambda}_e$)(Deg/Sec)
8
6
4
2
0
-2
-4
-6
-8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 874


TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up at Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
Range in Feet x 10³

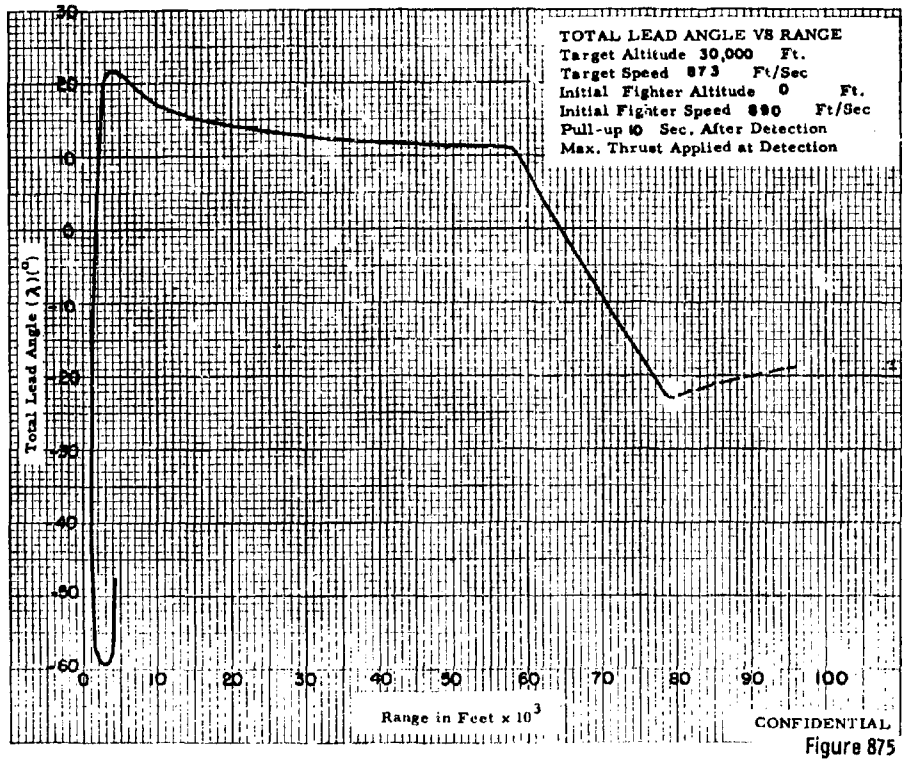
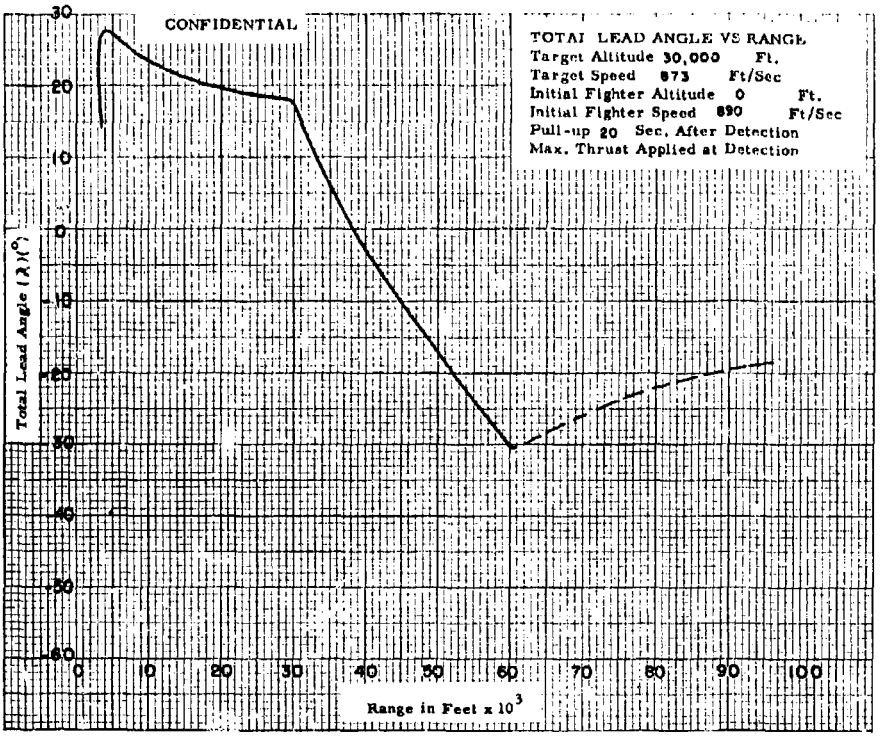

TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 10 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
Range in Feet x 10³

Figure 875


TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
30
20
10
0
-10
-20
-30
-40
-50
-60
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

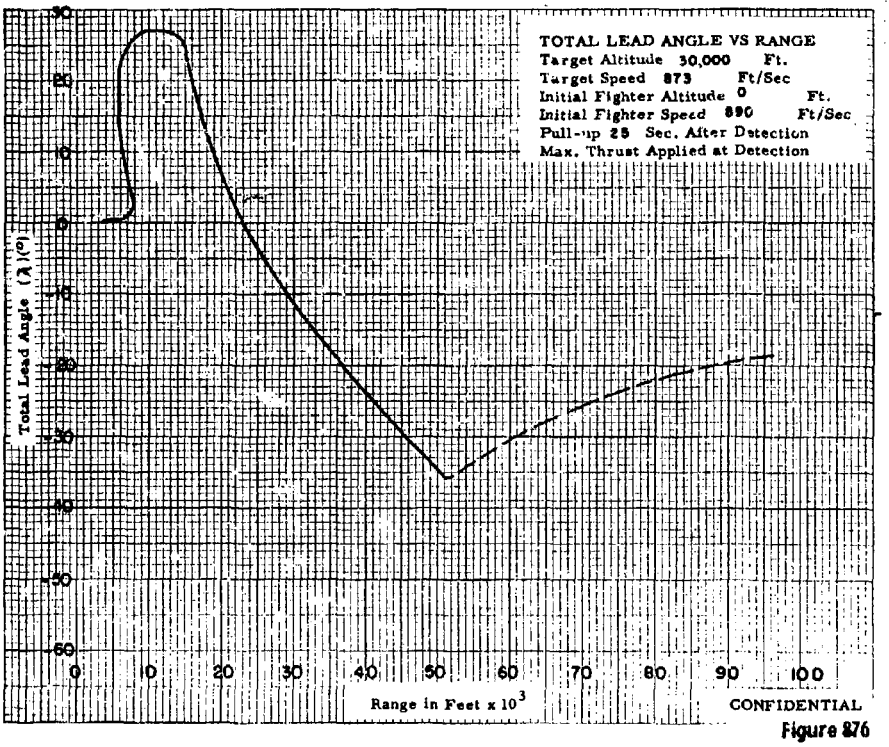

TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
30
20
10
0
-10
-20
-30
-40
-50
-60
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 876

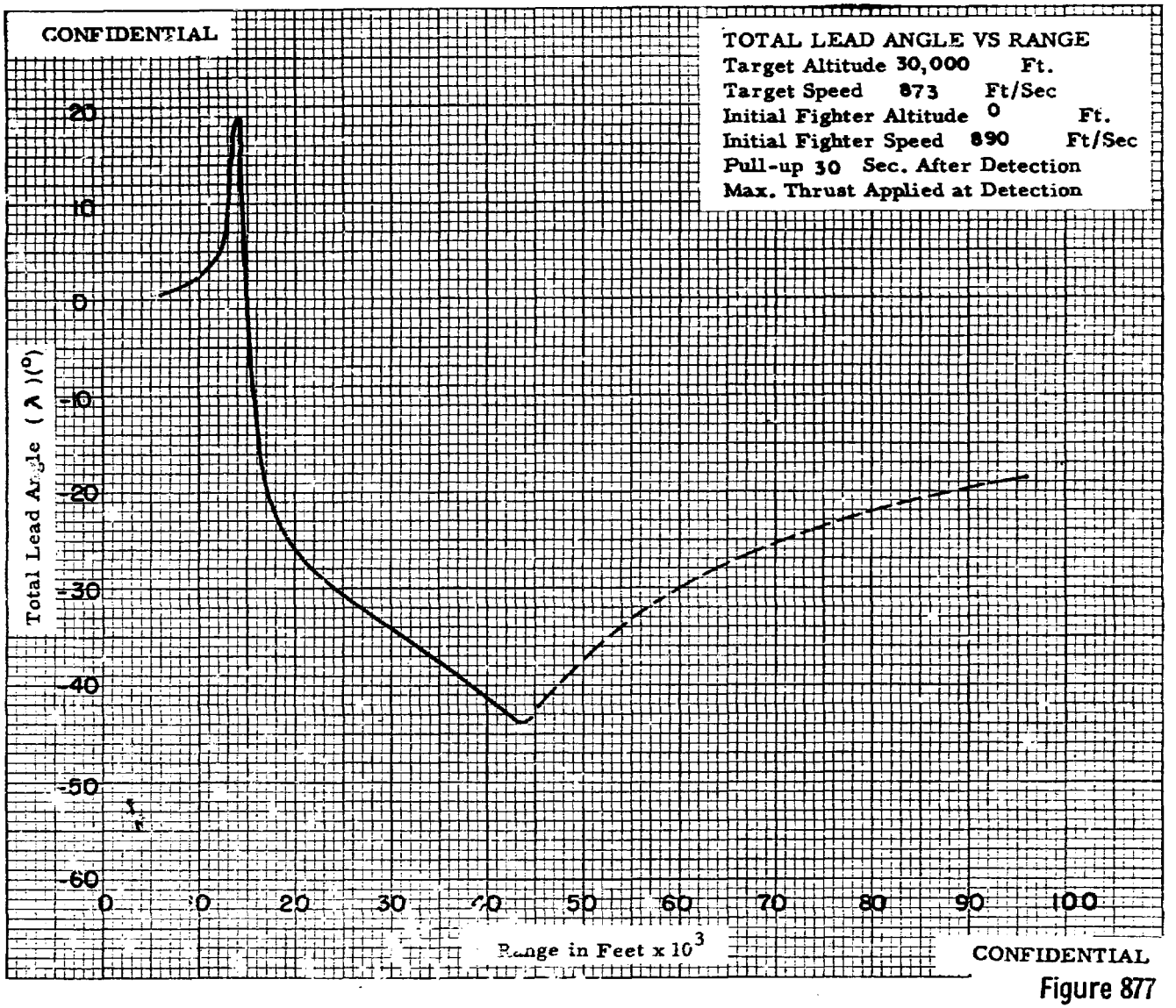
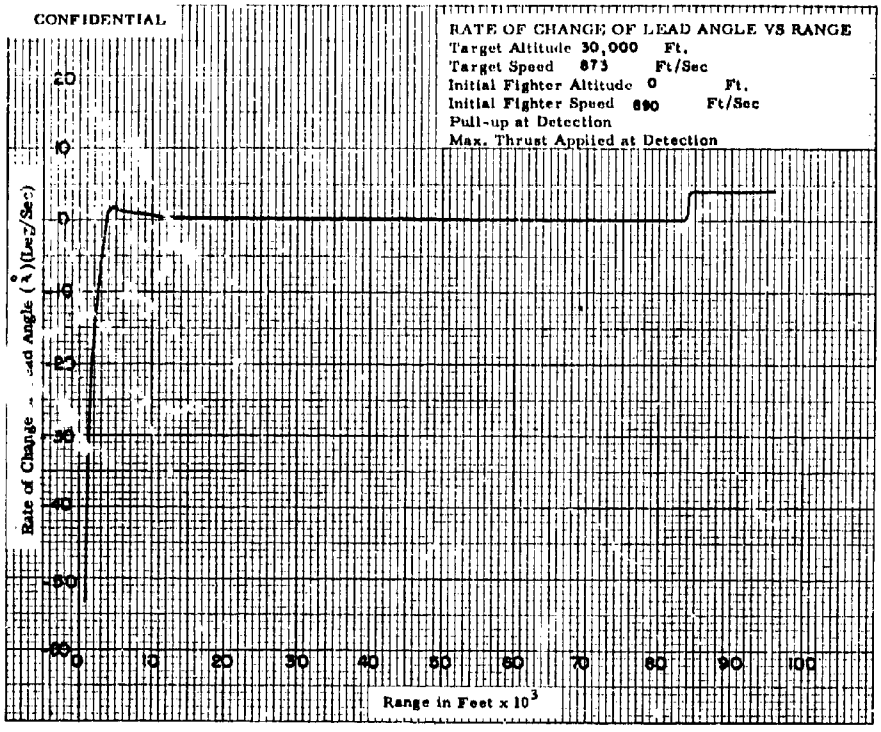
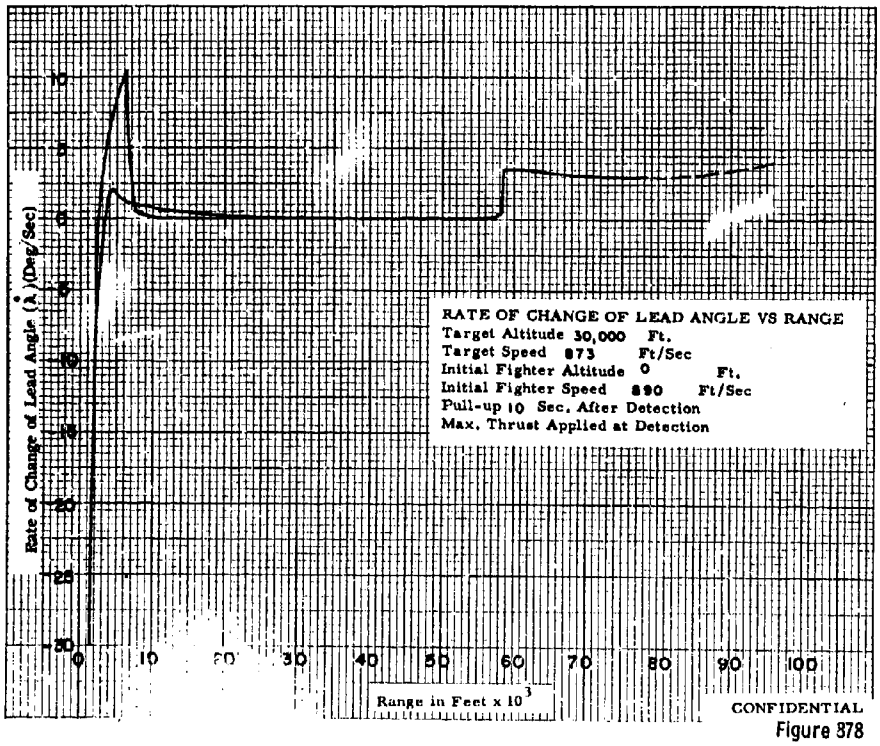

CONFIDENTIAL
TOTAL LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 30 Sec. After Detection
Max. Thrust Applied at Detection
Total Lead Angle (λ)(°)
20
10
0
-10
-20
-30
-40
-50
-60
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Figure 877

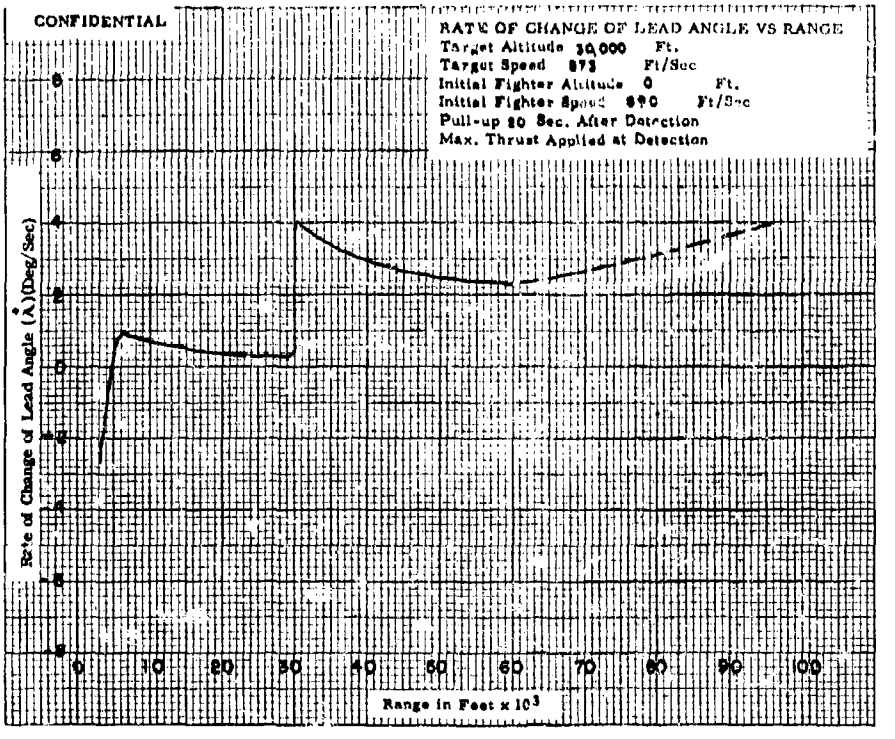
CONFIDENTIAL





CONFIDENTIAL

Figure 378


RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 20 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
8
6
4
2
0
-2
-4
-6
-8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

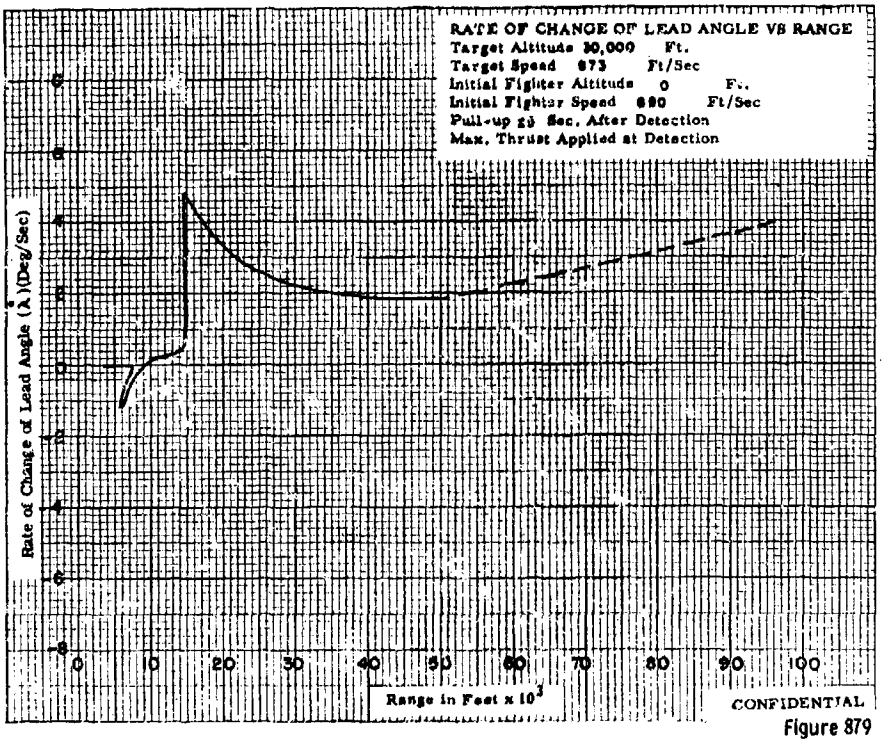

RATE OF CHANGE OF LEAD ANGLE VS RANGE
Target Altitude 30,000 Ft.
Target Speed 873 Ft/Sec
Initial Fighter Altitude 0 Ft.
Initial Fighter Speed 890 Ft/Sec
Pull-up 25 Sec. After Detection
Max. Thrust Applied at Detection
Rate of Change of Lead Angle (λ̇)(Deg/Sec)
8
6
4
2
0
-2
-4
-6
-8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³

Figure 879

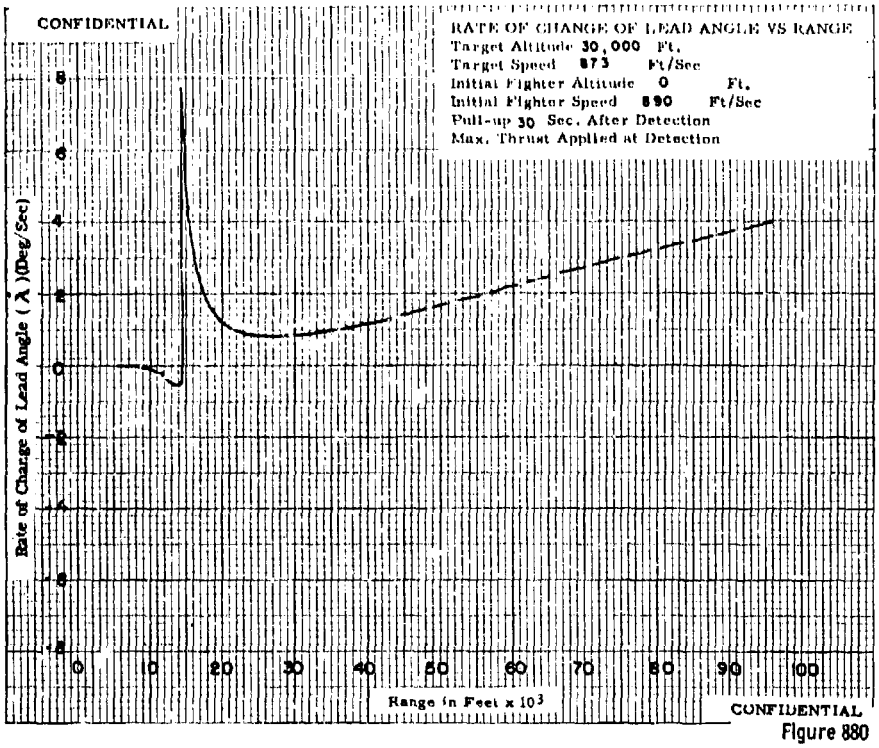


Figure 880

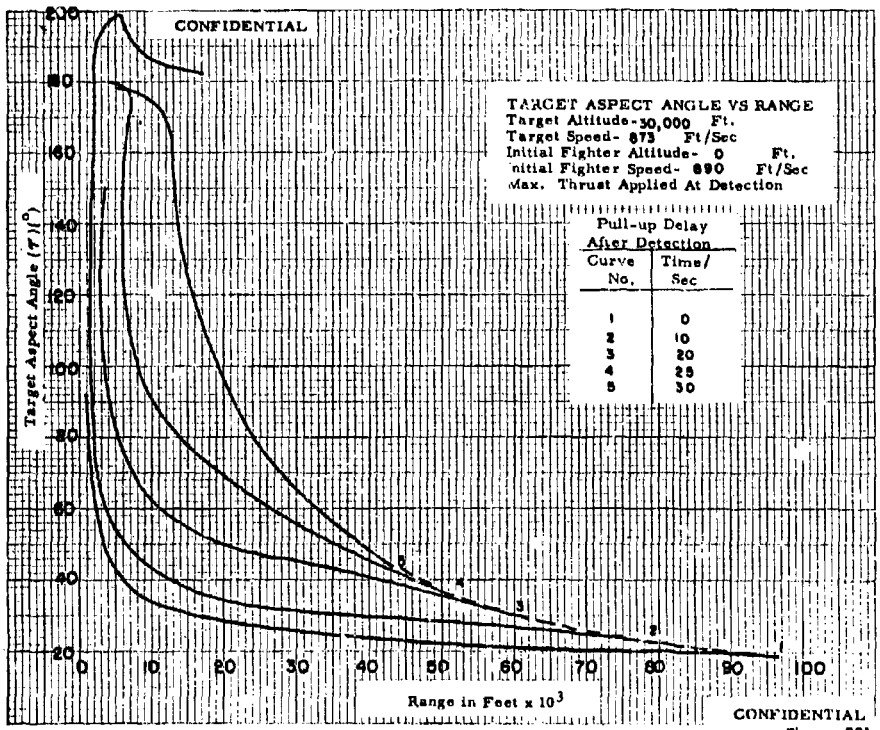


Figure 881

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Ryon,J. C.
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